National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, tests publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.

NL-339 (r. 88/04)

Canada

UNIVERSITY OF ALBERTA

HYPNOSIS AND PAIN MANAGEMENT

BY

NEIL FRIEDENBERG

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

IN

COUNSELLING PSYCHOLOGY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA
FALL, 1988

Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

ISBN 0-315-45742-2

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Neil Friedenberg

TITLE OF THESIS: Hypnosis and Pain Management

DEGREE: Doctor of Philosophy

YEAR THIS DEGREE GRANTED: Fall 1988

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

Neil Friedenberg

~~24,~~ 2554 Whiteley Court

North Vancouver, B.C.

Date: August 22, 1988

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Hypnosis and Pain Management submitted by Neil Friedenberg in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Counselling Psychology

Supervisor

Date: June 30, 1988

Abstract

One hundred and two subjects were randomly assigned to one of four treatments: indirect hypnotic analgesia, direct hypnotic analgesia, control followed by indirect hypnotic analgesia, and control followed by direct hypnotic analgesia, in order to test the relative effects of the treatments on tolerance, heart rate, pain report, and distress. Ratings on a Likert-style scale were also obtained on a number of beliefs and expectations about hypnotic analgesia. The cold pressor test (Hilgard & Hilgard, 1983) was employed as the pain stimulus.

The major findings of the study are as follows:

1. Neither treatment group was more effective than the control group on the four pain measures.
2. Subjects in the indirect group with low confidence in their ability to experience hypnosis and in the efficacy of hypnosis, did as well on the measure of pain report as subjects with high confidence on the same variables in the direct group, and thus confirming the relative effectiveness of the indirect verses the direct treatment for resistant subjects.
3. Self-confidence and desire to tolerate the ice water as long as possible was significantly related to pain management. Confidence in hypnosis however, was not related to pain management.
4. Subjects' response to experiencing the suggestions effortlessly, was related to decreased pain reports, decreased distress, and reports of finding the hypnosis useful.
5. Subjects in all treatment groups used similar coping strategies in managing the pain, although these strategies were not given as part of the treatment. Hypnotic subjects reported the use of these strategies was relatively effortless compared to their use in the control condition.
6. Some hypnotic subjects reported that hypnosis was detrimental to pain management as they felt too relaxed to sufficiently enact strategies. And as a result of the demand characteristics of the experiment, some hypnotic subjects did

not actively use coping strategies because they did not want to interfere with the assumed benefit of the hypnotic analgesia.

ACKNOWLEDGEMENTS

The author wishes to acknowledge Drs. P. Calder, F. Boersma, N. Thomas, R. Jevne, and J. McNamarra for their contribution in the completion of this thesis.

Special appreciation is extended to all the volunteer subjects who gave so much of their time and effort.

TABLE OF CONTENTS

I INTRODUCTION....1
II REVIEW OF THE LITERATURE....5
The Concept of Pain....5
Hypnotic Analgesia in Experimental Settings....6
Analgesic Properties of Hypnosis....12
Definitions of Hypnosis....12
Hypnotic Susceptibility....15
Direct and Indirect Inductions....18
Pain Measures....22
Physiological Measures....22
Self-Report....25
Subject Variables....27
Gender and Pain....27
Control....29
Summary of Review and Research Questions....31
Research Questions....34
Formulation of the Study....35
III METHODOLOGY....38
Design....38
Subjects....39
Apparatus and Experimental Setting....39
Procedure....40
Variables....42
Research Questions and Analysis of Data....44
Analysis of Variance....45
Multivariate Analysis of Variance....45
Multivariate Analysis of Covariance....46
Correlations....47
Interview....48

1V RESULTS 49
Analysis of Variance 49
Histograms on Time 50
Treatment Groups on Post Questions 52
Gender Comparisons 53
Hypnotic Ability 58
Multivariate Analysis of Variance 61
Multivariate Analysis of Covariance 62
Correlations 63
Results of Interview 67
V Discussion 72
Discussion of Results 72
Implications for Theory 80
Suggestions For Further Research 82
Implications for Therapy 84
Summary of Findings 85
References 87
Appendix A Introduction 103
Appendix B Pre Questions 104
Appendix C Post Questions 106
Appendix D Direct Induction - Description 108
Appendix E Indirect Induction - Description 109
Appendix F Credibility 110
Appendix G Indirect Induction 111
Appendix H Direct Induction 117

LIST OF TABLES

Table 1

One Way Analysis of Variance Between Direct, Indirect, and Control Groups on Heart Gain, Distress, Pain Report, Time,.....50

Table 2

One Way Analysis of Variance Between Groups on Post Questions.....53

Table 3

One Way Analysis of Variance Between Female Indirect (N=22) verses Female Control (N=18) and Male Indirect (N=12) verses Male Control (N=15) on Dependent Measures.....54

Table 4

Analysis of Variance Comparisons by Sex - Indirect Treatment on Dependent Measures. N = Males 12, Females 22.....55

Table 5

Analysis of Variance Comparisons by sex - Direct Treatments on Dependent Measures. N = Males 16, Females 19.....56

Table 6

One Way Analysis of Variance Comparison by Sex. Control Group on Dependent Measures. N = Males 15, Females 18.....57

Table 7.

One Way Analysis of Variance Comparisons by Hypnotic Ability. Direct Treatment on Dependent Measures. N = High 16, Low 9.....58

Table 8

One Way Analysis of Variance. Comparisons by Hypnotic Ability. Indirect Treatment on Dependent Measures. N = High 9, low 15.....59

Table 9

Two Way Analysis of Variance. High and Low Ability by Direct and Indirect Treatments on Pain Report.....60

Table 10

Means and Sample Size. Treatment by Hypnotic Ability on Pain Report.....60

Table 11

MANOVA Followed by Univariate Analysis of Variance Comparing Treatment Groups on (1) Time, Heart Rate, Report, Distress (2) Post 1, 2, 4, 5.....62

Tables 12-17

Pearson Correlation Matrix on Pre Questions and Dependent Measures on Combined Treatment Groups. N = 69.....64

Table 18

Techniques and Experiences Reported by Subjects in Interview.....68

Table 19

Comparison Between Control and Treatment Conditions. N = 35.....70

LIST OF FIGURES

Figure 1. Design of Experiment 38
Figure 2. Design of Study. Treatment With No Pretest 49
Figure 3. Histogram on Time. Direct Group 51
Figure 4. Histogram on Time. Indirect Group 51
Figure 5. Histogram on Time. Control Group 52
Figure 6. Design of Study. Pre Test Followed by Treatment 69

I INTRODUCTION

Therapeutic interest in hypnosis as an effective control agent in the management of pain has produced numerous articles from the clinical and experimental areas. A number of reviews address important variables in pain management and hypnosis (Elton, Stanley, & Burrows 1983; Wagstaff, 1981; Hilgard and Hilgard, 1983). Considerable discussion in these reviews has centered around types of hypnotic inductions, personality characteristics, and psychosocial variables in relation to the pain experience.

This research into the pain experience has recently generated significant advances in its management. Finer (1983) for example, writes of the increase of pain clinics where the significance of understanding the psychological components of pain are realized in the treatment of pain as both a psychological and physiological problem. If further understanding of the psychological components of pain are understood, methods may be devised to alter or perhaps even eliminate the experience in some case.

The purpose of this study is to compare two hypnotic treatments for experimentally induced pain. This comparison is important because pain needs to be alleviated as quickly and as efficiently as possible. Pain is major concern in surgical procedures, a major cause in absences from work and a source of considerable personal depression. If an intervention can be effective either singularly or in conjunction with other analgesics such as pharmaceuticals, then searching for such a tool is a valid pursuit. A psychological approach through hypnosis is relevant because it is recognized that the experience of pain is largely a psychological as well as a physiological event.

Aa hypnotic treatment is important in another area as well. Part of the pain experience is considered as the distress or suffering component. Individuals clearly experience stress and suffering in other areas of their lives. If hypnosis can be effective in the suffering associated with pain, the same interventions may be useful in many other areas of human distress. The interest in hypnosis also derives from its apparent ability in some cases to be

effective where other methods have failed and again, in some cases to completely eradicate the pain experience in a very short time

To measure the effects of a hypnotic intervention an experiment is designed in this study as an analogue in the experience of pain. Kazdin (1978) in a paper on evaluating the generality of findings in analogue research writes that all treatment research is an analogue of the situation to which a researcher wishes to generalize. He emphasizes that while analogue research may allow for greater control, further research is needed to investigate the "influence of departures from clinical situations along various dimensions and the implications of such departures for generalizing results to clinical situations" (p. 684).

One of these departures for example, concerns the effectiveness of experimental procedures for chronic pain sufferers. Usually, this can only be inferred or approximated. While the design is limited in this fashion it has the advantage of testing specific aspects of the treatments that may not be practical or ethical in clinical situations. One may consider that in a clinical population not all individuals have the same history in terms of their pain experience nor are the ethical considerations the same when the therapist withholds treatment as a control condition for a clinical population in severe pain.

In an analogue study the subjects are given the same pain stimulus as a standardized feature under the same conditions. This permits excluding other factors as effecting the results other than the treatments that are being tested. For example, the increase in pain intensity may be controlled as well as the approximate duration of the pain stimulus. In a clinical condition it would be difficult to determine the similarity in pain experienced between individuals and to exclude other variables of how pain is experienced such as history in the length of suffering.

The obvious disadvantages of analogue studies involve the comparison to clinical populations. Volunteers for example, may be significantly different from non volunteers to make generalizations hazardous. Other differences may appear in the comparison of exposure to ice water to other sources of pain, knowledge that the

pain will end compared to chronic suffers with no similar degree of certainty and differences associated with the experimenter variable. However, when the intention is to study the relative efficacy of different treatments the analogue design in this study allows for sufficient control to make statements of comparison sufficiently valid.

In order to compare the two hypnotic treatments the cold pressor will be applied as a stressor. The cold pressor consists of a container filled with ice water and the subject is required to immerse his or her hand in the water while pain measures are taken. The attempt here is to discover how the treatments compare on four dimensions: tolerance or length of time subjects are able to keep their hands in the water, the self-report of pain during the immersion, the distress or suffering incurred, and comparison of heart rate. The use of more than one dependent variable was considered significant because the pain experience has more than one dimension. The two treatment groups are also compared with a control group on the same measures. The indirect and direct methods of hypnotic induction and suggestions for analgesia and are described in detail in Chapter 11 and Chapter 111.

Another feature of this study is the testing of subject variables that may have an important relationship to the treatments. Because individuals differ in their attitudes, expectancies, beliefs and motivations, questions will be asked in order to assess their relevancy in the experiment and particularly how they relate to the treatment variables. If these variables are treated as discriminatory elements they may assist in accounting for the difference and possible similarity, between the two hypnotic treatments. For example, confidence in the treatment may be more pronounced in one treatment as compared to the other and this variable may relate significantly to pain relief. Alternatively, these variables may not interact with the treatment variables but will significantly correlate amongst themselves and with other dependent pain measures. For example, self-confidence in one's ability to tolerate pain may correlate with pain tolerance in one treatment but not with the other. Knowing this information would be of assistance in

understanding the relative efficacy of the treatments. These subject variables will be further expanded upon and described in the second and third chapters.

The first part of this paper will involve a discussion of some of the major issues coming from the literature on hypnosis and the analgesic properties. Because there is considerable disagreement or uncertainty about what hypnosis is, this discussion will present a brief review of some major issues of definition presented by some of the major writers in the area. The relevant topics in this area are those of hypnosis as a state verses trait condition, hypnosis as an altered state, and the element of role playing as an explanation for the hypnotic phenomenon.

In this chapter an overview of the objectives of the study has been given along with the procedures of how it was conducted. In Chapter 11 a review of the literature will be presented as it relates to the purpose of the study.

II REVIEW OF THE LITERATURE

The review of the literature will serve to relate issues directly to the use of hypnotic treatments. These include the concept of pain, the analgesic properties of hypnosis, pain measurements, susceptibility to hypnosis, and the issues in the social psychology of experimental studies in hypnosis. The use of the cold pressor and the dependent and intervening subject variables will also be described. Finally, the main questions to be asked in the study will be clarified.

The Concept of Pain

In a review on pain definitions Elton, et. al. (1983) write that there is no universally accepted definition of pain. The same authors point out that there are some concepts of pain that are commonly accepted by several authorities in the area. The most important of these concepts is that of the combined sensory and affective component of the pain experience (Beecher, 1968; Melzack, 1973). A critical feature of this interactive view of pain is the individualized response to pain. This has important implications for the psychological management of pain as it relates to hypnotic interventions. As much of the explanatory nature of hypnotic analgesia derives from the conceptualization of pain as being comprised in part from socially conditioned subjective sensory experiences involving such elements as distress and contextualized meaning of pain (Barber & Adrian 1982), a brief discussion will serve to highlight the major aspects and the relationship to hypnotic analgesia.

One of the most widely accepted conceptualizations of pain has been the interactive interpretation of Melzack (1973) and the gate-control theory. According to this theory when pain stimulus occurs and activates the receptor system, it triggers a nervous system that incorporates past experiences, socialization, anxiety, and the meaning of the experienced pain. There is an interaction of the pain stimulus with learned experiences. The sensory system transports information about the location, duration, character (e.g. dull, piercing) and intensity qualities of the stimulus while a

motivational-affective system transports information about the aversive qualities. These two elements are processed independently and correspond to the large and small fibres entering the spinal column. The large fibres can lower the experience of pain while the small fibres may intensify the experience. The "gate" is the mechanism balancing the activity of the large and small fibres. The cognitive evaluative system can either open or close the gate and thereby modify the experience of pain.

Hilgard (Hilgard & Hilgard, 1983) draws parallels between his research of the pain experience and that of Melzack. A major contribution of the "gate-control" theory of pain is the distinction between and interaction component of the sensory and suffering experience. Hilgard (Hilgard & Hilgard 1983) has shown that if separate ratings of pain and suffering are requested in an experimental setting, subjects are able to distinguish between the two. Ratings tend to rise in an orderly way with mounting intensity of pain.

Sternbach (1968) along with Hilgard, recognizes the multi dimensional aspects of pain definition. In addition to the sensory and suffering components as put forth by Hilgard, he conceives of three elements: pain as a harmful stimulus suggesting possible damage, a pattern of responses recognizable to an external observer, and the subjective experience of pain.

In summary, the models of pain as put forth in this section point to the significance of pain as a psychological as well as physiological experience. Conceptualizing pain as involving cognitive interpretations makes psychological interventions appropriate. The individual is recognized as making judgements about the experience as part of an evaluative interpretation. If this evaluation can be modified through psychological treatment alterations in the experience may be effected.

Hypnotic Analgesia in Experimental Settings

The clinical literature of the last several years is compiled of numerous reports and documented cases of hypnosis having significant pain reducing effects (Anderson, Basker, & Dalton, 1975;

Erickson, 1966; Barber, 1977). The results from experimental studies in hypnosis and pain control however, suggest that the effects of hypnosis are more equivocal.

Some research has indicated that hypnosis with instructions for analgesia was no more effective than instructions only for analgesia, and low susceptible subjects given hypnosis with instructions to reduce pain were no more effective than a control group in reducing pain. (Spanos, Kennedy, & Gwynn, 1984). Hypnosis with suggestions for analgesia was no more effective than suggestions alone in reducing pain compared to a control group (Spanos, Radtke-Bordorik, Ferguson, & Jones, 1979), and hypnosis was no more effective than a placebo in treating clinical and experimental pain in chronic pain patients (Snow, 1979).

Spanos et. al. (1984) report that instructions only for pain reduction was more effective over all ranges of hypnotic susceptiblity than was hypnosis with instructions. The offered explanation for the difference has to do with the social psychological aspects of hypnotic conditions. Following a test for susceptibility low susceptibles were told they were to receive a hypnotic treatment. However, as a result of their poor performance on the test they may hold negative attitudes toward hypnosis and define themselves as not being able to experience the hypnotic analgesia. Consequently, low susceptibles do not perform as well as the high susceptibles who as a result of the testing define themselves as "good subjects" and may not do anything that might "ruin the experiment" (Fillenbaum, 1966).

Jones and Spanos (1982) report that low susceptible subjects who connect the analgesia test with their prior hypnotic susceptibility testing, may respond in a counter-demand fashion as to convey the impression that they are not gullible. These subjects apparently do not engage in the degree of cognitive coping strategies that characterize high susceptibles. However, when high and low susceptible subjects are not pre tested they did not have an expectation and achieved similar amounts of pain reduction.

Other experimenter manipulation of subject expectation supports the hypothesis that expectations have a significant effect

on reported pain reduction. In a study on the expectation effects of hypnotic analgesia, Stam and Spanos (1980) reported that hypnotic analgesia was no more effective than a control group on pain report on the cold pressor test when the expectations were manipulated. In this instance the hypnotic group was told that hypnosis often makes people sluggish and experience difficulty in focusing their attention which makes pain reduction difficult. When the expectations were reversed and subjects given a positive expectation of hypnotic analgesia, the hypnotic group did significantly better than the control group.

The lack of an explicit permission to reduce pain may be taken as an implicit injunction not to do anything to reduce the pain. If subjects attempt to conform to the experimenter's instructions, then in those experiments comparing a hypnotic analgesia against a control group, the controls may not perform just as adequate attention-diversion tasks because they were not instructed to do so. Spanos et. al. (1984) found that control subjects exposed to experimentally induced pain failed to enact coping strategies. As a consequence they did not do as well as those subjects given coping suggestions. However, when they were told to "do whatever you can to reduce the pain" the differences disappeared. The differences found in experiments using control groups and hypnotic treatment groups may be attributed in part to the lack of giving the control subjects such simple instructions as to "try to keep their hands in the water for as long as possible". Given this permission control subjects may engage in just as effective coping strategies as do the hypnotic subjects.

Controls may use effective coping techniques even though they were not given instructions to do so. Spanos et. al. (1979) in specific reference to the control subjects who successfully employed spontaneous coping strategies write "...our findings underscore the danger of implicitly or explicitly assuming an equivalence between the treatments to which subjects are exposed and the nature of their experiences. Thus, in the present study the implicit assumption that control subjects (i.e., no hypnosis, no suggestion) did not employ cognitive strategies would have been incorrect and highly

misleading" (p. 290). Controls did not differ significantly from the group given suggestions for pain relief because both groups used coping strategies more or less effectively although the controls were not instructed to do so.

This last point also brings up the question of what do hypnotic subjects actually do when they are apparently experiencing hypnotic analgesia. Hilgard (1977) reports that hypnotic analgesia is a result of dissociating or separating the pain from awareness and only high susceptibles have this ability. While he recognizes that all subjects have the ability to relax and divert their attention, these are claimed to be relatively ineffective in reducing pain. Spanos et. al. (1979) however, argue that pain reduction as a function of a hypnotic intervention is a result of the use of cognitive coping strategies, and high susceptibles use coping strategies to a greater extent than low susceptibles. These strategies are used by the hypnotic subjects although they were not given instructions to do so and often report that they did nothing to reduce the pain. For example, Spanos et. al. (1979) states that approximately half of the subjects who used coping strategies denied that they did anything to reduce the pain.

Being involved in a hypnotic situation may imply permission to use cognitive coping skills the individual already possesses and is not necessarily the result of hypnotic suggestion. Spanos et. al. (1979) for example, write that many subjects do not use the suggestions for pain relief provided in the hypnotic suggestions. They found as well, that the "extent to which the subjects experienced suggested effects was more closely related to whether they used a strategy than to whether they had been provided with one by the suggestion" (p. 283). Furthermore, Spanos, Brown, Jones, and Horner (1981) found that subjects often used these coping strategies although they claimed to have done nothing to lessen the pain. Creating a situation where individuals may use the skills they already possess may be one of the most significant features of the hypnotic induction.

An important question remains about the degree to which subjects experienced hypnosis, if at all. In all of the studies cited in

this section, questions about the degree of hypnotic experiencing were not asked of subjects who allegedly experienced hypnosis. In a review of the literature Laurence and Nadon (1986) report that measures of hypnotic depth have produced varying results. The authors write of a complex interaction of experiential, cognitive, and contextual variables. They suggest that research must take into account this multidimensional element of "phenomenological, situational, cognitive, and motivational factors implicated in verbal reports...." (p.215). Radtke and Spanos (1981) for example, report that subjects' reports of hypnotic depth are the "outcome of a complex interaction involving contextual information, self-observation, and preconceptions concerning hypnosis" (p.359) rather than reflecting the degree to which subjects are in a hypnotic state. The question then of whether or not subjects experienced hypnosis independent of the above factors is difficult to determine.

The subjects' experience of trance in these studies may also be dependent on the length of induction. In the studies comparing hypnotic analgesia with a control group for example, the inductions were relatively brief: Spanos et. al (1984) - 10 minutes, Spanos et. al. (1979) - 7 minutes, Stam and Spanos (1980) - 10 minutes, and Van Gorp et. al. (1985), 7 minutes. It is not clear what the results of these studies might have been if the inductions were longer with greater repetition and detail. Erickson and Rossi (1976) describe the condition that passes for hypnosis in most experimental research as probably nothing more than a minor alteration of everyday reality. Hypnosis defined in their terms as a dissociated state, does not usually result until the hypnotist and individual have spent considerable time together in "hypnotic training". Hilgard (Hilgard & Hilgard, 1983) however, reports that for high susceptibles a dissociated state can occur in untrained subjects in a considerably shorter period of time.

In summary, the experimental literature suggests that hypnotic analgesia with suggestions of pain reduction through imaging, is only effective for high susceptibles because they have greater imaginal ability and have a positive expectation about the test situation. When subjects over all levels of susceptibility are

not influenced by the demands of pre test susceptibility, and are given coping instructions or analgesic suggestions that do not rely on the ability to image, the addition of a hypnotic induction becomes irrelevant. Controls have been found to enact coping strategies that are just as effective as hypnotic suggestions for pain relief although they have not been instructed to do so. The question of subjects experiencing hypnosis is also dependent on a number of complex interaction variables, especially expectation.

This section has also introduced the phenomena known as the "demand characteristic", common to many experimental designs employing human subjects. In a review of the literature, Rosenthal and Rosnow (1975) credit Orne (1969, 1970) as being one of the first to research the biasing effects of subject's compliance with the demand characteristics of the experimental situation. According to Orne, demand characteristics are the totality of task-orienting cues that dictate subjects' hypothesis about role expectations. Orne's contention is that subjects play out their experimental roles in their wish to help the experimenter, science, and human welfare in general. Subjects infer what responses would be most desirable in accordance with what they believe to be the experimenter's hypothesis. Demands can be explicit as in the experimenter telling subjects that certain responses are expected, or implicit as when an attitude questionnaire is given twice with some intervening persuasive communication. Given this role-playing behavior of subjects, experimental findings may be to some unknown degree, an artifact of the demand characteristic rather than an outcome of the experimental variable.

A number of subject motivations are given as explanations for responses to demand characteristics (Rosenthal & Rosnow,1975) Among these is the notion that volunteer subjects are compliant to demand characteristics as a function of a desire to project a favorable image. However, a counteracquiescent set may arise when subjects perceive that their freedom to act is constrained by demand characteristics.

In a review of the literature in this section illustrations were given of both demand and counter-demand characteristics being

operative in experimental studies on hypnosis and pain management.

Analgesic Properties of Hypnosis

Generally, the accounts of pain reduction through hypnotic analgesia are the result of the hypnotist suggesting in some manner that pain will be controlled and the client in some manner "going along" with those suggestions. There are necessary requirements for these suggestions to be defined as an hypnotic intervention.

The operative function in hypnotic analgesia is the ability to effortlessly and vividly imagine that the suggestions are occurring (Hilgard & Hilgard,1983; Bowers, 1978; Bowers, 1979; Spanos & Barber, 1974). Hilgard in one example of hypnotic analgesia, writes that suggesting to an individual while in trance, that their hand is numb or asking them to imagine the "switches" controlling the pain response are turned off is often enough to induce hypnotic analgesia.

Bowers (1979) writes that there are two conditions that must be present for these suggestions to have hypnotic effect: ability and effortlessness. For a suggestion to be effective it must be received in an uncritical manner and as something that seems to happen to the individual. Whatever effort is involved it must be dissociated from the individual's experience to be recognized as a hypnotic experience (Hilgard,1977). It is this absorbed and dissociated effect that distinguishes hypnotic response from simple compliance. The second critical element necessary for hypnosis is the individual's "ability" to experience the suggestions effortlessly and in a dissociated manner. Clearly, Hilgard makes a definite claim that some individuals have this ability and others do not. Others (Erickson, Rossi & Rossi, 1976: Barber, 1977) report that virtually all individuals do have this ability. Spanos et al. (1979) report that the critical element of pain relief through hypnosis is the ability to enact cognitive coping strategies that are not contingent only on imagibility or dissociation.

Definitions of Hypnosis

In the last section the characteristics of the analgesic properties of hypnosis were presented. The present discussion will

define other characteristics of hypnosis that explain its effect and serve as a basis for distinguishing direct from indirect inductions. This discussion of defining hypnosis will proceed as follows: hypnosis as role behavior, hypnosis as dependent on expectations and motivations, and hypnosis as dissociation.

Wagstaff (1981) conceptualizes hypnosis as a function of individuals responding to a social psychological situation that occurs in a sociocultural context. The contention that subjects are naive and simply respond to the induction as passive recipients relegates to a secondary position the perceptiveness of social rules and expectations that individuals bring to any social situation. "The modern hypnotic subject plays the game of 'hypnosis' according to the rules laid down by the hypnotist, our cultural notion of hypnosis and his individual attitudes and preoccupations" (Wagstaff, 1981, p. 219).

Sarbin and Slagle (1979, p. 300) for example, suggest that "hypnotic performances can be regarded as role enactments, the subject taking the role of the hypnotized person within limits imposed by his expectations, skills, self-conceptions, and by the demands of the situation, including audience effects". The contention is that hypnosis and waking conditions are continuous and requires no special state conception of the trance experience.

Barber (1976) and Chaves and Barber (1974) are also representative of those writers who favor the subject's motivation, attitude, and expectations as critical components of the hypnotic experience. One enters trance when certain conditions are met: analytical and critical thinking is temporarily suspended, a positive attitude about the experience is maintained, expectations that the experience will be beneficial, desire to have the experience, and allowing the suggestions to manifest without conscious effort. To these conditions Wickramasekera (1976) adds subjects taking permission to act "as if" and ignore everyday reality. Barber, Spanos and Chaves (1974, p. 5) write that "subjects carry out so-called "hypnotic" behaviors when they have positive attitudes, motivations, and expectations toward the test situation which lead to a willingness to think and imagine with the themes that are

suggested".

As two of the most influential writers in hypnosis as a treatment for pain are Milton Erickson and Ernest Hilgard, a description of their accounts is warranted here. Another reason for presenting their work involves the association they have with the methods of induction of interest in this study; Erickson with indirect and Hilgard with direct. In contrast with the previous writers in this section the discussion on these authorities will address the unconscious and dissociated states of hypnosis rather than the social psychological aspects

Erickson, M. Rossi, and E. Rossi (1976) refer to therapeutic trance as a special state that intensifies the patient-therapist relationship and focuses the patient's attention on a few inner realities. Because of this restricted orientation learning occurs more intensely and creatively. It is this inward focusing along with the relegating of typically conscious associations to a secondary level that describes the unique process of entering hypnosis. It is the task of the therapist to assist the individual in "depotentiating" usual conscious associations by structuring a demarcation between the hypnotic state and ordinary consciousness. Any hypnotic response takes place by dissociating any behavior from its usual associational context.

Ernest Hilgard (Hilgard & Hilgard, 1983; Hilgard, 1977) essentially concurs with Erickson's description of trance as a dissociative state characterized by an alteration in cognitive control systems. However, Hilgard adds the additional feature of the "hidden observer" that is not stressed in Erickson's work. While the conscious function becomes dissociated from every day reality, Hilgard and Hilgard (1983) suggest that there is a covert presence of a "hidden observer" observing the events and experiencing on a level not accessible in every day reality. In studies on experimentally induced pain and hypnosis. Hilgard found many of his subjects expressing little discomfort but, he was able to access a "hidden part" of the individual that was experiencing the pain at a much fuller intensity. In some manner, the individual dissociated from that part that was experiencing the pain. Hilgard (1977) in a paper

on "divided consciousness", explains the event by referring to cognitive systems that are relatively autonomous and hypnosis as the modifying of executive and monitoring functions so that the hierarchial relationship becomes changed. What was once voluntary becomes involuntary, and what was once perceived may now not be perceived. The splitting off of cognitive subsystem from their usual associations is described as dissociative. Part of this splitting off involves the individual "giving" some of the executive function over to the hypnotist who invites dissociation by suggesting for example, the individual permits closure of the eyes and listens only to the voice or words of the hypnotist.

In summary, this section presented hypnosis from different perspectives. Hypnosis was seen to be role enactment as well as being mitigated by subjects' expectations and motivations. Finally, the unconscious and dissociated states were presented as descriptions of hypnosis that go beyond the social psychological explanations.

Hypnotic Susceptibility

It has been indicated that Hilgard and Erickson display considerable agreement in their descriptions of hypnosis. However there is considerable disparity in their belief about hypnotic susceptibility and the role it plays in hypnotic analgesia. Put simply, Hilgard proposes that ability is a fixed condition and only some can benefit from hypnosis and Erickson argues that hypnotic ability is irrelevant and virtually all can benefit significantly from hypnosis. This section will lay the foundation in addressing that issue.

In his advancement of hypnosis as a fixed trait, Hilgard (Hilgard & Hilgard, 1983) writes that entering trance depends on hypnotic ability and only a specific proportion of the population has this trait. He reports a correlation of .50 between measured susceptibility and reduction of pain in a cold pressor test. Pain is reduced by one third or more by 67 percent of the highly hypnotizable but only by 13 percent of the low hypnotizable, as based on scales of susceptibility. Other evidence for the correlation between susceptibility and hypnotic analgesia is fairly extensive

(McGlashan, Evans, & Orne, 1969; Evans & Paul, 1970; Spanos, Radtke-Bodorik, Ferguson, & Jones, 1979). Highly susceptible individuals are judged as possessing the ability to dissociate, focus attention and to suspend critical judgement in an effortless manner (K. Bowers, & Kelly, 1979; P. Bowers,1978; Karlin, 1979).

Others, such as Barber (1977), Erickson and Rossi (1979), and Angelos (1973) report that susceptibility holds as a predictor of hypnotic efficacy only when the induction is given in the conventional authoritarian style, commonly referred to as direct inductions. Conversely, when inductions are given in a permissive indirect manner susceptibility is less highly correlated with hypnotic analgesia. Barber (1977) for example, reports virtually one hundred percent success in treating one hundred dental clients with indirect inductions while the literature in support of the relevancy of susceptibility would have predicted a much lower success rate (Wadden & Anderson, 1982).

It would appear that given the opportunity to enter trance by an indirect induction, most individuals might exhibit the same pain reducing characteristics that are found in those high susceptible individuals given a direct induction. That is, demonstrated ability to dissociate, focus, effortlessly experience, and suspend critical judgement. The critical difference is the induction and not the apparent abilities possessed by the subjects.

This reported effectiveness of indirect hypnosis may indicate that susceptibility as commonly measured, may be an artifact of the measuring instruments and not something that stands independently from attempts to describe it. Susceptibility has been traditionally measured by the Harvard Group Scale of Hypnotic Susceptibility (HGSHS; Shor and Orne,1962) and the Stanford Hypnotic Susceptibility Scale (SHSS; Weitzenhoffer & Hilgard, 1962). These scales are comprised of a series of questions and behavioral responses designed to measure subjects' responsiveness to hypnosis. If the subject achieves a high score they are considered to be high susceptibles. And it is this group that is considered to possess the trait of susceptibility that makes them suitable candidates for hypnotic analgesia.

Hilgard (Hilgard & Hilgard, 1983) found that only high susceptibles were able to achieve significant levels of pain reduction following a hypnotic induction with suggestions for pain relief. Spanos et. al. (1984) suggests that these findings are the result of high susceptibles having greater imagability and a more positive attitude toward the test situation than medium and low susceptibles. Susceptibility measured by standard tests such as the Harvard Group Scale of Hypnotic Susceptibility, Form A (Shor & Orne, 1962), usually invite the subject to imagine particular situations such as imagining a heavy weight pressing down. When analgesic suggestions rely on the subjects' ability to image, medium and low susceptible subjects are further disadvantaged because they are not given instructions to use perhaps just as adequate nonimaginal coping strategies.

In a review of the literature Spanos et. al. (1979) report that when hypnotic and nonhypnotic subjects are not selected on the basis of hypnotic susceptibility, and are given analgesic suggestions, similar reports of pain magnitude are recorded. These results are likely due to the findings that only a minority of about 30% of the population are highly susceptible to hypnosis (Hilgard, 1965) as measured by standard susceptibility scales and the predominance of medium and low susceptibles would eliminate any significant findings from high susceptibles alone. When only high susceptible subjects in a within-subjects design are chosen, pain relief was enhanced following hypnosis with analgesia suggestions. Taken together, these findings indicate that hypnotic procedures are of little benefit to medium and low susceptibles. Furthermore, these results may also be contingent upon the type of hypnotic induction (Barber 1977).

The SSHSS and HGSHS are commonly regarded as direct inductions (Barber,1980). Subjects are administered a hypnotic induction and are requested to experience specific suggestions that may be experienced subjectively by the subject as well as objectively by an observer. If the individual reports a significantly high number of subjective experiences and the observer reports a significantly high number of objective measures than the individual

is classified as highly susceptible to hypnosis. The hypnotic inductions employed in pain control studies have most often been the same or very similar direct inductions employed in testing for susceptibility. Therefore, susceptibility may be a bias of the measuring instrument

A significant condition of these findings may be that the relationship between hypnosis and pain relief only holds true for inductions given in the form of direct hypnotic suggestions. These findings suggest the criticality of susceptibility be examined more carefully.

Results from other studies (Schafer & Hernandez, 1978; Perry, Gelfand, & Marcovitch, 1979) support the premise that there are other factors that may be of greater importance than susceptibility. Perry et. al. for example, report that susceptibility is secondary to motivation as the most critical variable in cessation of smoking. And Lazarus (1973) maintains that individuals' attitudes to being hypnotized are more related to therapeutic success than susceptibility.

In summary, hypnotic susceptibility is defined as the ability to dissociate, suspend critical judgement, and effortlessly experience. While some studies report that susceptibility is an unalterable trait and only high susceptibles are able to take optimum benefit from hypnotic analgesia, other studies suggest that susceptibility is an artifact of the measuring instrument and that susceptibility becomes irrelevant when an indirect verses a direct hypnotic treatment is given. Variables such as belief, expectation, attitude, and motivation may be more relevant than susceptibility.

Direct and Indirect Inductions

In the previous sections we discussed those of aspects of the literature dealing with the analgesic properties of hypnosis, conceptualizations of hypnosis, and the relevancy of hypnotic susceptibility. This was done in an attempt to set up the relevant characteristics of indirect and direct inductions as they pertain to this study. In this section the inductions will be discussed and related studies reviewed.

Hypnotic inductions are the interactions that occur between

hypnotist and subject in order to expose or create the condition of trance. These can vary widely from the obscure and metaphoric, as in most of Erickson's work, to the concrete and explicit, as in much of Hilgard's research. The procedures tend to vary according to purpose, therapist understanding of hypnosis, situational conditions, personalities of the therapist and subject, and the relationship between them.

The direct method is characterized by the operator making a clear, direct request for specific responses. One of the best examples of this approach is the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962). Generally, use of this method is used when hypnotic responsiveness is seen as a trait possessed by the subject and that one is either hypnotizable or not. Little attention is paid to the unique responses of the subject and the hypnotist is required to deliver the induction in a relatively standardized manner (e.g., "your eyes are getting heavy", "you are going more deeply asleep"). The procedure is dependent upon the therapist behaving in an authoritative directive manner and the client accepting a relatively passive and in some ways inferior position relative to the therapist (Bellissimo & Tunks, 1984; Erickson & Rossi, 1979).

One of the characteristics of indirect induction that may account for some of its alleged superiority to a direct induction, is the apparent sense of control that is granted to the individual rather than control remaining solely in the hands of the hypnotist (Matthews, Bennett, Bean, & Gallagher, 1985; Fricton, 1985). Theoretically, the subject has a choice rather than merely accepting, or more damaging, resisting the directives of a more direct conventional induction. The indirect method does not rely solely on the following of suggestions but incurs the willingness of the subject in entering into a cooperative relationship with the therapist whereby the subject freely explores possibilities of new associations and experiences in ways that are uniquely situated for that individual (e.g., "you may wonder how you would really like to relax"). The suggestions are intend to be ambiguous and allow more latitude for the individual to experience the suggestions in his or

her own manner (Matthews et al.,1985). Indirect induction is consequently an individualized approach as opposed to the more standard presentation of the direct induction. Most of Milton Erickson's publications and that of Joseph Barber (1977) are widely accepted examples of indirect inductions.

In an effort to make the hypnotic process as effective as possible, the indirect method of induction has been formulated to engage and thereby use the subjects responses and experiences to the induction as elements that facilitate entering into a hypnotic state. Erickson in Haley (1967), Barber (1977) Erickson and Rossi (1979), and Lankton and Lankton (1983) write that the indirect hypnotic induction is characterized by: (1) permissive language allowing the subject to be in control with frequent use of indirect suggestion, (2) interspersing words that facilitate associations, (2) truisms encouraging ideomotor and ideosensory processes, (3) open-ended suggestions (4) covering all possibilities of a class of responses, (5) compound suggestions, (6) questions or statements that focus or reinforce awareness, plus several other techniques described by Erickson and Rossi (1979).

Several studies have been written citing evidence of indirect inductions being superior to direct inductions, primarily as being more effective with some persons defined as relatively resistant to other forms of hypnotic induction. Most of these studies have been on the analgesic properties of hypnosis. Barber (1977) reports successful pain reduction using indirect induction in 99 out of 100 dental patients. Barber was introduced as the dentist's assistant and worked with regularly appointed patients requiring a normal variety of dental procedures. Suggestions for relaxation were interspersed within the normal conversation and suggestions were given for deep relaxation, comfort, reinterpretation of events, and amnesia. A posthypnotic suggestion was given to encourage analgesia during the dental procedures. When the patient was fully alert the dental treatment began.

Barber and Mayer (1977) found that an indirect method of induction could significantly reduce pain in subjects without regard to measured hypnotic ability in each of 14 subjects in experimental

dental pain. Angelos (1978) in a study comparing low susceptibles on direct and indirect inductions for pain relief found that the indirect group did significantly better on pain report than did the direct group. Fricton and Roth (1985) report that the indirect method was significantly more effective than the direct method in changing pain thresholds regardless of susceptibility. Another study however, has shown that the direct method is superior. Van Gorp, Meyer, and Dunbar (1985) for example, in a study comparing direct hypnotic analgesia, indirect hypnotic analgesia, suggestion only, relaxation, and a control group found that only the direct group reported a significant decrease in terms of reported pain.

In an attempt to assess the efficacy of the indirect method of hypnotic analgesia Hilgard (1979) reported that he was unable to duplicate the success of Barber (1977) although he cites no data. He states that while the indirect method may assist in increased relaxation "pain reduction involves both sensory pain and suffering and is not attributable to anxiety reduction" (p. 190). He suggests that an indirect induction is no more effective than traditional methods but adds that an indirect induction may be particularly effective when increased relaxation and the reduction of anxiety are of greater importance than sensory pain.

There have been significant differences in design and measurement that make comparisons between direct and indirect inductions difficult. For example, where one study will use threshold (Fricton & Roth, 1985) others might use tolerance or pain report (Van Gorp et. al. 1985) as dependent measures. As well, it is not always clear what is passing for examples of direct and indirect inductions in these studies.

In summary, direct inductions are characterized by a standard authoritative approach in which the subject is expected to follow and experience the prescription as declared by the therapist. The indirect approach relies on cooperation with the subject by giving permissive suggestions that will enable the subject to enter trance in his or her own individual way. The indirect verses the direct induction is viewed by some to be more effective in promoting pain control ability in a greater number of subjects by being effective

over a greater range of hypnotic susceptibility.

Pain Measures

In a previous section mention was made of the disparity in measurements of pain reported by studies on the effects of hypnotic analgesia. In this section a review of pain measures will be undertaken with the purpose of providing a rationale for the measures used in this study. The section will begin will a review of physiological measures and conclude with a review on subjective measures and pain tolerance.

Physiological Measures

In a review of the literature on the physiological measures of hypnosis in pain relief Barber (Barber & Adrian, 1982) reports that the neurophysiological mechanisms are not known. Barber cites Goldstein and Hilgard (1975), and Barber and Mayer (1977) as finding that hypnotic analgesia for experimental pain is not reversed by the administration of naloxone hydrochloride. Finer and Terenius (1981) report that endorphin levels in spinal fluid does not change in patients undergoing hypnotic analgesia. These findings suggest that hypnosis as an analgesia is not effected by the action of endorphins.

Physiological correlates that would indicate a distinctiveness of hypnosis separate from relaxation have produced nonsignificant results (Negley-Parker, 1986). Bowers (1976) reports that there are no differences between hypnotized subjects and relaxed subjects in terms of blood pressure, heart rate, or respiratory rate.

Hypnosis in pain control studies does not have a significant influence on physiological measures. Elton, et. al.(1983) report that while physiological indicators of pain reduction in hypnotic analgesia have been sought, the results have been unsuccessful. A number of the studies indicate that physiological responses have actually run counter to expectations. For example, Bowers and van der Meulen (1972) reported an increase in both GSR and heart rate when dental patients received both hypnotic and chemical analgesia. They concluded that if physiological measures are indicative of pain relief then both hypnosis and chemical analgesia should be ineffective. The conclusion might be that physiological measures

indicate levels of arousal rather than just levels of pain.

Holmes, Hekmat, and Mozingo (1983), Van Gorp, Meyer, and Dunbar (1985), and Hilgard and Morgan (1975) have measured for heart rate changes. These studies indicate that heart rate on pre and post measures did not differ following a hypnotic induction nor did these measures show any difference in the control group as compared to the groups administered the hypnotic inductions. For example, Van Gorp et. al. (1985) found that while there was a significant difference on self-report of pain on pre and post measures, heart rate remained the same following a hypnotic intervention on the experience of pain.

Inconsistent results have occurred in measurements on heart rate. For example, on one study heart rate is positively related to pain (Hilgard & Hilgard, 1983), shows no change in another (Hilgard, 1971), while in still another study Barber and Hahn (1962), found no significant pattern in heart rate as a function of hypnotic analgesia.

Hilgard claims there is not a single indicator of pain that varies in a reliable way with degrees of pain. Similar views are expressed by Lenox (1970). Hilgard (1975) for example, measured changes in blood pressure in a cold pressor test and found a positive correlation between pain intensity and the physiological measure. The experiment was conducted again with a hypnotic analgesia. While subjects reported a decrease in pain intensity there was a rise in blood pressure.

The nonsignificant findings on physiological measures may be partly a function of the anticipatory arousal experienced by subjects in pain control experiments and the effort needed to produce hypnotic analgesia. Hilgard and Hilgard (1983) write that maintaining hypnotic analgesia requires some effort by the subject even though he knows he will be successful in reducing pain and that this effort is accompanied by physiological signs of anticipatory excitement.

The findings also suggest in part that physiological measures are indicators of arousal and not pain per se (Wolff, 1980). Hilgard writes that the cardiovascular changes in hypnotic analgesia were essentially those in normal waking. Whether or not pain was felt did

not seem to matter. Although physiological responses may indicate pain they may also occur in the absence of or independently of pain.

Another factor relevant to the difficulty in finding consistent physiological measures associated with hypnotic analgesia has to do with individual differences. Lacey, Bateman, and Van Lehn (1953) report that while some subjects respond with a given hierarchy of autonomic activity regardless of stress stimulus, others show greater fluctuations according to stress source. Some subjects exhibit one pattern more frequently while others randomly exhibit one pattern or another. Another problem arises that in general, the higher the pre-stimulus tension, the smaller the magnitude of response. The same authors report that no single measure of physiological response can serve as an index as to the total "arousal" of the individual nor are these measures sufficiently correlated. Lacey (1953) reports one study in which palmar conductance did show an impact of stress while for the same individuals heart rate did not.

In summary, the data on physiological correlates with hypnotic analgesia have not produced conclusive results. There is no single indicator that varies in a reliable way with degrees of pain. Cardiovascular changes in hypnotic analgesia are very similar to those in the nonhypnotic condition and are not dependent on whether or not pain is experienced. While physiological responses may indicate pain, they may also occur independently or in the absence of pain. Finally, there are considerable differences among individuals on physiological responses to pain including the channel of response. For example, respiratory measures may correlate with stress for one individual, while for another individual only pulse serves as measure of stress. As a result of the above findings certain conclusions may be drawn:

(1) The choice of any physiological measure may unwittingly eliminate all those individuals who only respond to any one of a number of other physiological measures.

(2) Physiological responses may occur independently from pain and may relate to arousal and not pain per se.

(3) Anticipatory stress may raise pre test physiological measures to such a degree that the treatment effect may be quite insignificant.

(4) Anticipatory excitement in entering a hypnotic trance and effort in maintaining it may correlate with some elevated physiological measures even though pain reduction is successful.

Self-Report

Given the relatively inconsistent results of physiological measures, most experimental studies in hypnotic analgesia have tended to rely on subjective verbal reports. In this next section some of the most common subjective measures are presented.

Verbal measures of the pain experience in hypnotic research have been frequently used to gather reports on pain threshold (Fricton & Roth, 1985; Mathews & Searle, 1976; Joy & Barber, 1977) and pain discomfort (Hilgard & Hilgard 1983; Stam & Spanos, 1980). While some experiments have used pain tolerance or the duration that subjects are able to keep their hands in ice water (Friedman, Thompson, & Rosen, 1985; Beach, 1981; Raphael, 1981; Notermans & Tophoff, 1967). This measure is sometimes considered to be more an indication of courage or pain endurance.

In favor of self-reports Hilgard (Hilgard & Hilgard,1983) argues against using pain threshold, or the point at which sensitivity is experienced, because the real problem is assisting subjects to cope with continuous pain well past the threshold level. On the other hand he also rejects pain tolerance as being a measure of courage or heroism. Instead Hilgard and others (Spanos et. al. 1981; Van Gorp et. al. 1985; Stam, Petrusic, & Spanos 1981) have chosen to elicit verbal reports of pain discomfort.

Hilgard (Hilgard & Hilgard, 1983) maintains that subjects do report severity in a uniform manner consistent with time of exposure and temperature of the water in the cold pressor. Hilgard reports that subjective pain reports are negatively correlated with the temperature of the water and increase in a direct relationship to the length of immersion. Measures of suffering or distress have also

been employed by Hilgard (Hilgard & Hilgard, 1983) and he reports subjects are able to make the distinction between sensory pain and distress. The experience of distress progresses in the same orderly way as pain reports but at a lower parallel level.

A variation on self-report, are measures of self-prediction. In a review of the literature on self-prediction, Osberg and Shrauger (1986) note that several authors report the inaccuracies of predicting future behavior using traditional assessment techniques such as testing data, historical information and clinical judgment. As a result, the suggestion is for greater attention to individual's self-assessments or predictions.

The argument for self-prediction measures is partly based on the assumption that self-relevant information is readily available and salient to the individual and that we are motivated to obtain information about our abilities and competence (Trope, 1983). The motivation to predict our own behavior may be a manifestation of individuals' attempts to develop a better understanding of and greater sense of control over their environment. Other theorists (e.g. Wicklund & Gollwitzer, 1983) argue that motivation for self-prediction is an outcome of successfully maximizing interpersonal functioning as a process of self-assessment.

While the research in the area of self-prediction is relatively recent, the literature suggests that some areas of investigation may produce particularly valuable results. Among these is the issue of self-prediction accuracy being target specific along dimensions of social desirability, emotionality, and the evaluation of events. Another interest is assessing the accuracy of self-prediction as playing a role in psychological adjustment through improved personal and interpersonal functioning. And in terms of a study on experimental pain employing the use of hypnosis, it would be interesting to note the accuracy with which individuals could predict their pain tolerance. More importantly, certain variables may be correlated with this accuracy that would justify their manipulation in an experimental design. One of the most obvious would be the factor of external verses internal locus of control.

In summary, while some studies in hypnotic analgesia employ

pain threshold, the most common measures have been tolerance or the length of time exposed to the stressor, and the subjective pain reports given over a period of exposure to the stressor. Tolerance shows validity as a pain measure in the cold pressor and while the subjective pain experienced seems to increase at a uniform rate up to approximately one minute, the pain after that point seems to fall and raise in a predictable pattern. Pain tolerance is sometimes dismissed as being a measure of courage rather than an accurate indicator of the pain actually experienced. For that reason, subjective pain reports are more often favored. However, some of the problems of using self-reports are as follows:

(1) They may be subject to falsification

(2) They may not be uniformally related to the severity of the stressor.

(3) The report may have a reactive effect in sensitizing the individual to the experience and influencing perception.

Subject Variables

The last two sections reviewed the literature on inductions and measures of pain reduction. In this section the subject variables that are of interest in the study will be reviewed. These variables will be examined on the measures of pain reduction.

Gender and Pain

The influence of gender on hypnotic behavior will be examined on pain threshold, pain tolerance, pain report, cognitive style, effortless experiencing, creativity, and hypnotizability. In the review that follows in this section, some of the relevant data on these variables are examined.

The Influence of sex and the experience of pain has been relatively unequivocal; males have higher pain tolerances and pain thresholds than women, and report less subjective pain (Yeargan, 1986; Strassberg & Klinger,1972; Jaremko, Silbert, & Mann, 1981; Otto & Dougher, 1985; Woodrow, Friedman, Siegelaub &Collen, 1972; and Folkard 1976). Notermans and Tophoff (1967) found that men were able to tolerate greater pain but pain thresholds relative to women did not differ.

Friedman, Thompson, and Rosen (1985) found that gender made no difference in terms of pain report, tolerance, or distress after suggestions for analgesia in a cold pressor test. Spanos, Brown, Jones, and Horner (1981) report that no significant effects were found for sex in another study employing hypnosis on a pain report measure. Taken together, these studies suggest that there may have been an initial gender difference in pain report but the hypnotic treatment cancelled out the difference.

Raphael (1981) found that depending on cognitive style, verbalizers versus visualizers, there was a gender difference. For example, female verbalizers did significantly worse in an imagery treatment for pain reduction than they did on a self-instructional treatment.

P. Bowers (1978) in a study on effortless experiencing, creativity, and hypnotizability found that there was no effect for sex. K. Bowers (1971) however, found that sex was a significant factor in creativity and susceptibility, with females showing a significant relationship between creativity and hypnotic susceptibility.

Yanchar and Johnson (1981) report that women score higher than males on absorption defined as a disposition for having episodes of "total" attention "that fully engage one's representational (i.e., perceptual, enactive, imaginative, and ideational) resources" (Tellegen & Atkinson, 1974), although the difference is relatively small. On subjective and objective measures of hypnotic susceptibility, Pistole (1978) found that females had significantly higher results than males. In another study Barber and Calverley (1964) did not find a significant difference in hypnotic responsiveness controlling for gender.

In summary, while males initially report less subjective pain, and greater pain threshold and tolerance, the evidence suggests that following hypnotic analgesia there are no gender differences on these variables. The influence of gender appears in terms of absorption and susceptibility is inconsistent, but females may show a higher correlation with creativity. In general however, males tend to report less pain and greater tolerance than do females.

Control

Control in relation to pain and hypnosis may be regarded in the following ways: the information given to the individual in terms of the invasive procedure, belief in the efficacy of the treatment, and the degree to which individuals feel control lies external to their own volition. These categories of pain control will be reviewed here.

Subject control of the pain experience has been shown to increase pain tolerance if subjects know that a pain stimulus is about to occur, if time is allotted for the individual to prepare, and if individuals are given a reasonable amount of information of what is about to happen (Feuerstein & Skjei, 1979).

Control has also been regarded as it relates to cognitive activities. Cognitive control for example, is the processing of information in such a manner to lessen the effects of stress. Meichenbaum (1977) reports that cognitive control through adaptive self-statements can effectively counter inappropriate responses to stressors. In a review of the literature on the effectiveness of cognitive controls Gill (1984) cites a number studies: it is reported to reduce physiological arousal (Holmes & Houston,1974); decrease reported pain (Chaves and Barber, 1974) and decrease the need for analgesics (Langer et al. 1975). Dworkin and Chen (1981) confirmed these findings in reporting that varying cognitive input was effective in reducing pain in both clinical and experimental conditions.

Other writers have also discussed the relevancy of control as it relates to pain management and other stressful conditions. Kanfer and Seider (1973) report self-control is more effective in coping with cold when subjects have control over the noxious stimulation. Subjects are expected to experience less anxiety as a result and thereby decrease their pain experience.

Subjects' expectancy or belief of control may be more important than the content of the control. Girodo and Wood (1979) for example, write that the expectations of the utility of the treatment is what determines its success. Bandura (1977) reports that interventions are successful to the extent they change subjects' belief about personal effectiveness because they promote coping

behavior.

The role of subject expectancy has been investigated as it relates to hypnosis. Kirsch, (1985) reports that expectations of involuntary behaviors in the hypnotic condition are major determinants of hypnotic responses and hypnotic inductions enhance expectations. Council, Kirsch, Vickery and Carlson (1983) found that if subjects were given a detailed description of the induction process, there were high significant correlations between expectancy of performance and perceived credibility of the treatment, and between expectancy, susceptibility, and trance depth. It may be as Bandura has indicated that these expectancies of the utility of hypnosis translate into subjects enhanced use of their own personal effectiveness through coping behavior.

Considerable research has been published concerning the relationship between hypnosis and locus of control. The results have been variable. Pistole (1978) reports that locus of control was not statistically significant either as a main effect nor in interaction with gender in a study on hypnotic susceptibility. Comparing a taped direct with a taped indirect induction, Hungerford (1984) found that there was no relationship between response to direct or indirect induction and locus of control. Miller (1976) in a study comparing self and hypnotist directed hypnotic treatments with locus of control, found that there were no significant differences between internal and external locus of control groups nor were there any interaction effects.

Other studies have suggested that locus of control does make a difference in hypnotic response. Bean and Duff (1975) report that subjects with an external locus of control rated themselves as having experienced hypnosis more fully. The authors interpret this as a response to the demand characteristics of the hypnotic situation.

In summary, control may function as an aspect of pain relief in the following manner:

(1) Knowledge about the stressor and giving preparation time to deal with the stressor may encourage individuals to make their own cognitive plan.

(2) Individuals belief in the effectiveness of the treatment for control may be more important than the actual content of the control because such expectations encourage coping behavior.
(3) Personal confidence or self-efficacy may be one of the most important factors in dealing effectively with pain.

Summary of Review and Research Questions

Direct and indirect inductions in particular have raised considerable interest as effective treatments. However, they have not been tested on a number of different measures in the same study, they have not been tested with a number of intervening subject variables, and the rationale for the indirect induction in terms of eliminating resistance has not been tested. It is not clear to what extent subjects view either induction as one in which they have control as opposed to the hypnotist having control. Nor is it clear to what extent subjects experience the suggestions with relatively little effort as suggested in the literature. The question remains as to how useful subjects report the suggestions to be and whether or not they were useful in helping them cope with the cold pressor. And finally, subjects' confidence in their ability to cope with the cold pressor with or without hypnosis is left open to question.

The following lists present some of the relevant findings from the literature review pertaining to direct and indirect hypnotic treatments for pain and specific variables of importance in experimental research on the analgesic effects of hypnosis.

Subjects' response to hypnotic analgesia may be related to demand characteristics, expectations, and motivation to experience hypnosis:

(1) Subjects who are pretested for hypnotizability may respond to the demand characteristics of being either "good" or "poor" subjects.
(2) Subjects who are given a negative expectation about the efficacy of hypnotic analgesia may do no better than controls.
(3) Subjects' reports of hypnotic experience may be effected by their self-conceptions of their hypnotic ability, their

definition of the situation as hypnotic, their belief in the credibility of the treatment, and their motivation to experience hypnosis.

(4) Hypnotic treatments may be effective because they promote coping behavior by changing subjects' belief about personal effectiveness.

The relevancy of the hypnotic induction in hypnotic analgesia is left open to question, and what subjects actually do in experiencing hypnotic analgesia may not relate directly to the suggestions. As well, the coping activity of controls in response to pain may be similar to that of the hypnotic subjects:

(1) Instructions or suggestions only for analgesia may be just as effective as hypnosis with instructions or hypnosis with suggestions.

(2) Hypnotic subjects may use cognitive coping strategies for pain reduction even though they have not been instructed to use them.

(3) Controls may use just as effective coping strategies as hypnotic subjects even when instructions are not given to use coping strategies.

(4) Control subjects may do as well as hypnotic subjects when they are told to do whatever they can to reduce the pain and may employ cognitive coping strategies spontaneously.

The experience of hypnosis may require specific responses from the subjects and the experience of hypnosis may require certain requirements in terms of length of induction and training:

(1) Hypnosis may be contingent on the ability to experience suggestions effortlessly, vividly and uncritically.

(2) Experiencing hypnosis as a dissociated state may depend on a lengthy induction and practice in experiencing hypnosis.

(3) Brief inductions with naive subjects in experimental studies may result in nothing more than a minor alteration of reality.

The critical differences between direct and indirect inductions for hypnotic analgesia may relate to the factor of subject resistance or inability to experience the suggestions as directed by the

hypnotist. These variables are relevant to the inductions as follows:

(1) Direct inductions may rely on subjects imagibility and these subjects comprise a minority of the population. The inductions are also given in a directive manner which may serve to incur subject resistance.

(2) Indirect inductions given in a permissive manner may allow the subject to experience the analgesic suggestions in his or her own unique manner and thereby avoid resistance from the subject.

The use of physiological pain measures in hypnotic analgesia has produced either nonsignificant or inconsistent results. Not all subjects respond to stress on the same physiological channel and there is some difficulty in determining what the physiological measure is a response to:

(1) Physiological responses may occur independently from the pain and may relate more to arousal.

(2) The entering and maintaining of hypnosis may incur a degree of physiological arousal that may mistakenly be interpreted as a response to pain.

(3) Anticipatory stress may raise the physiological measure to such a degree that the treatment effect may be negligible even though pain reduction has occurred.

Measures of pain have also been conducted employing tolerance or length of time of exposure, self-report of discomfort, threshold, and distress or suffering. All of these measures may have some disadvantages:

(1) Verbal self-reports of pain are frequently used although they may be reactive in sensitizing the subject to his or her experience and may also interfere with maintaining hypnotic analgesia.

(2) Pain threshold may be to a degree irrelevant because the more important factor may be in assisting individuals cope with severe pain rather than recognizing the experience of minor discomfort.

(3) Tolerance may relate more to endurance or courage rather than treatment effectiveness.

Gender as a variable in hypnotic analgesia while of significance outside of hypnotic analgesia tends to be nonsignificant in hypnotic conditions:

(1) In nonhypnotic conditions males show higher pain tolerances, report less pain and have a higher pain threshold.
(2) After hypnotic analgesia gender differences on pain measures are nonsignificant.

Research Questions

From a summary of the literature a number of general research questions were formulated. Specific questions will be presented in Chapter 111 along with applied methodology.

1. What are the effects on pain tolerance, pain report, distress, and heart rate of two approaches to modifying pain?
2 What are the effects of gender and two approaches to modifying pain on tolerance, pain report, distress, and heart rate?
3 How are the effects of subjects' beliefs in their hypnotic ability related to the dependent measures?
4. What are the effects of two approaches to modifying pain on the combined measures of tolerance, pain report, distress, and heart rate in an multivariate analysis?
5. What are the effects of two approaches to modifying pain on the combined dependent measures of experiencing the suggestions effortlessly, resisting the suggestions, finding the treatments useful, and experiencing a trance in an multivariate analysis?
6 What are the effects on pain tolerance, pain report, distress, and heart rate of two approaches to modifying pain when the all the variables in the pre questions are treated as single covariates. And what are the effects on the dependent measures of two approaches to modifying pain when subjects' belief in their hypnotic ability, belief in hypnosis as occurring effortlessly, and belief that hypnosis will be useful, are combined as covariates in a multivariate analysis?

7. To what extent do subjects' beliefs in the hypnotist's control of the experience relate to their ability to modify pain?
8. To what extent do subjects' ratings of the effectiveness of hypnosis correlate with their ability to modify pain?
9. To what extent do subjects' belief in their confidence to tolerate pain with or without hypnosis relate to their ability to modify pain.
10. To what extent do subjects' expended effort relate to their ability to modify pain?
11. To what extent do subjects' beliefs in the usefulness of the treatment relate to their ability to modify pain?
12. To what extent do subjects' ratings of trance experience in terms of depth relate to their ability to modify pain?
13. To what extent do subjects' ratings of their resistance relate to their ability to modify pain?
14. Do subjects use coping strategies?

Formulation of the Study

On the basis of the literature review, a study was conducted to compare the efficacy of an indirect hypnotic induction to a direct hypnotic induction in the management of experimentally induced pain. This section will include an outline of the procedures in the study, the method of pain induction, and the treatments.

There were two experimental conditions: indirect hypnotic analgesia and direct hypnotic analgesia. Each group received one of the treatments before being exposed to ice water as the painful stimulus. The control group was exposed to the water without benefit of a treatment. After measurements on the dependent variables the control group was then divided into either a direct or indirect treatment group. These later groups were then given the same treatment as the two previously mentioned treatment groups.

The treatments are described briefly here. Scripts of the inductions may be found in the appendices.

The indirect induction used in this research is adapted from an

Ericksonian naturalistic technique and published by Barber (1977) and adapted for use in a number of studies on hypnotic analgesia (Van Gorp, Meyer, & Dunbar, 1985; Fricton & Roth,1985; Angelos,1978). The induction consists of suggestions that are permissive, natural and intended to be congruent with the subjects experience and consistent with his or her needs. The language attempts to utilize the subjects experience thereby establishing agreement and rapport and then building a bridge to an experience of comfort and relaxation. The technique implies that control resides with the subject and employs methods such as double binds, confusion, imagery and symbolic language. For example, "I wonder if you are surprised to notice that your right hand might be warmer than your left, or if your left feels heavier than your right." The experimenter will note the non verbal responses of the subject such as breathing and body movements. By pacing suggestions with these responses the experimenter has increased the probability of establishing rapport and building the induction to be consistent with the subject's experience. For example, as the subject exhales the experimenter may pace the words "comfort", "relax", and "deep" at the end of each exhalation. Or, if the subject makes a movement the experimenter may comment on that and suggest that it demarks a progression to becoming further relaxed.

The direct induction implies that the experimenter is in control and the subject is following directions of a repetitive nature. The induction was given in a manner such that the experimenter maintains control and the subject is expected to follow the directives. This induction is frequently used by Hilgard and others and follows closely the same induction to test for susceptibility (Weitzenhoffer & Hilgard, 1962). For example, "you will go deeper and feel heavier with each step you take down the stairs". Angelos (1978) and Alman (1979). have used similar scripts.

The cold pressor is the most frequently reported pain stimulus in the experimental literature on hypnosis and pain, and according to Hilgard (Hilgard & Hilgard,1983) is a reliable instrument upon drawing conclusions from retest measures. Hilgard reports that the pain sensation mounts very rapidly and reaches a maximum within

one minute. Even at five degrees centigrade, the pain reached a critical level of at least 10 within 40 seconds as a average for 23 experimental subjects in one reported test on the cold pressor test. Rollman (1983) and Harris and Rollman (1983) report that tolerance employed in a cold pressor test is a valid pain measure accurately measuring the pain experience. The test is convenient to use and according to Leventhal, Brown, Schacham, and Engquist (1979) is useful in the investigation of coping strategies because it has a sufficiently slow onset of pain and distress to allow time for the employment of psychological techniques of pain management.

III METHODOLOGY

The main purpose of the study is to compare an indirect induction to a direct induction and a control group on the effectiveness of each treatment on measures of pain control. A number of other questions as outlined in Chapter 11 were answered. The method to be employed and the analysis will be described in this chapter.

Design

A total of 102 subjects were randomly assigned to one of four groups: (1) indirect induction, (2) direct induction, (3) control followed by indirect induction, (4) control followed by direct induction. All treatment groups received suggestions for pain control on an analogue test of pain.

Figure 1 Design of Experiment

R X_1 O_1	indirect treatment and observation
R X_2 O_2	direct treatment and observation
R C_3 O_3 X_4 O_4	control and observation followed by indirect treatment and observation
R C_5 O_5 X_6 O_6	control and observation followed by direct treatment and observation

R = Randomization
X = Treatment
O = Observation
C = Control

Isaac and Michael (1981) refer to this as a randomized control-group only design. After exposure to the treatment variables the groups are tested for the first time and the scores are compared

to measure the effect of the treatment variables and tests of significance are employed to determine whether these differences are greater than those than might have occurred by chance. Employing treatments after the control in groups three and five allows for the testing of pre test effects. If there are no pre test effects, groups one and four, and two and six will be combined in further analyses

Subjects

The 102 male and female university students students were randomly assigned to one of the four groups. There were forty-two male and sixty female subjects. The age range was 18 to 56 years, with a mean age of 29.77 and a standard deviation of 8.68 years. Individuals were told that the study is being conducted on hypnosis and reactions to cold water.

The subjects were approached as groups in class rooms or individually in various settings on the campus. The overall ratio of acceptance was approximately two to seven. When subjects were approached individually the rate of acceptance was about one in three. An approximately equal number of males and females were approached but the rate of volunteering was higher for women as apparent in the ratio of male to females.

Subjects were told that the experimenter would immerse their hands in ice water and while some subjects may find the experience uncomfortable, it is not dangerous. The experimenter would give feedback on the results of the experiment to the subjects if requested to do so.

Apparatus and Experimental Setting

The experiment took place in a laboratory at the University of Alberta. The author was the sole experimenter and carried out all tasks involved in the study. Subjects were seated in comfortable reclining chair and could conveniently place their hands in the ice water without effort following a standardized procedure reported by Spanos et. al. (1983). The ice water apparatus was adjusted to suit

subjects individual physical dimensions.

Ice water kept at zero to two degrees centigrade in a plastic container served as the pain stimulus. Adding ice cubes to the water kept it at the desired temperature. The experimenter tested the temperature before and after immersion. To prevent the possibility of the hand warming the water surrounding the hand, the experimenter stirred the water at thirty second intervals. A stop watch was used to record the length of time subjects kept their hands in the water and was also used to elicit self-reports of discomfort at the appropriate intervals. All subjects were required to remove any rings or jewelry and to immerse their hands to wrist depth. They were instructed not to clench their fist or move their hand while in the ice water. Subjects were asked if they had any prior experience with the cold pressor or had frost bite on the immersed hand in order to reduce bias. No individuals were disqualified from the study on that bases.

Procedure

Each treatment subject was greeted by the experimenter and asked to fill out the pre questionnaire.(Appendix B) to answer questions on their expectations and beliefs relevant to hypnosis and pain control. These questions are designed to address the beliefs individuals have about hypnosis, how effective they feel hypnosis will be to them in this experiment, and their perceptions about their own abilities to cope with the ice water without a hypnotic intervention. The control subjects did not fill out the pre questionnaire

After filling out the pre questionnaire, the subjects read a description of the induction (Appendices D and E) depending on what group they were assigned to. They were then asked the following questions as a measure of induction credibility using a Likert seven point scale (Borkovec & Nau, 1972; Council et al. 1983):

1. "How logical does this procedure seem to you?"
2. "How confident are you that you can become hypnotized by this method?"

3. How confident would you be in recommending this procedure to a friend who wanted to experience hypnosis?"

4. "How willing are you to experience this type of hypnotic induction?"

5. "How effective do you think this hypnotic procedure would be in helping someone cope with immersing their hand in ice water."

Subjects were then seated in a chair beside a plastic container filled with ice water. The experimenter explained that the purpose of the test is to measure tolerance, reported pain, distress and heart rate to ice water exposure. Subjects were told that the experimenter would place their non-dominant hand in the ice water at a uniform depth and they would be asked to keep their hand in the water as long as possible. They were also instructed in using the self report scale and asked to report their experience of pain on a seven point scale (1 = total comfort, to 7 = unbearable pain). A heart rate was taken before and during the immersion by use of a Sport Tester PE 2500. This instrument consisted of a monitor placed against the skin just under the heart. The monitor was kept in place by an adjustable belt. The recording device was worn on the experimenters wrist in the fashion of a wrist watch.

As the subjects reclined in the chair, the experimenter gave them either a direct or indirect induction for hypnotic analgesia (Appendices G and H). At the end of the induction which took approximately twenty minutes, the experimenter placed their hand in the ice water and timing began. A ceiling of five minutes was placed on the length of time any subject could keep his or her hand in the ice water as a precaution against injury (Raphael, 1981; Spanos et. al., 1981; Harris & Rollman, 1983).

Subjects were asked to report their pain experience five seconds after immersing their hands in the water and every thirty seconds there after. When the subjects took their hands out of the water or at the end of five minutes, which ever came first, the time and subjects' self-report of over all distress was recorded. The post questions were then administered (Appendix C). Finally, the subjects

were interviewed and asked to describe how they were able to keep their hands in the water and any thoughts or feelings they experienced during the immersion.

The control subjects were greeted by the experimenter and asked to relax quietly for ten minutes while a resting heart rate was monitored and recorded. The experimental procedures in terms of the measurements were explained. They were asked to immerse their non dominant hand in the water and recordings were conducted as in the treatment groups. They were not given the pre questions or post questions. However, they were asked to describe their experiences while their hand was in the water and to account for length of time they kept their hand in the water. Following their treatment in the control condition they were given one of the treatment conditions following the procedures as already described for those conditions.

The total time between the subject entering the laboratory and leaving, was approximately one hour. The subjects were thanked for their participation and told that they will receive the results of the experiment if they are interested.

Variables

In order to assess beliefs and expectations all subjects in the treatment groups were asked a number or pre questions. And in order to assess the experiences of the subjects after the treatment a number of post questions were asked. All questions were on a seven point Likert style scale. The pre questions may be considered in the following groupings:

A. Susceptibility:
   (1) Subjects self-rating of their ability to experience hypnosis
   (2) Subjects self-rating on suggestibility

B. Hypnosis as a State:
   (1) Hypnosis as an altered state of consciousness
   (2) Hypnosis as a focused normal state of consciousness

C. Control:
   (1) Hypnotist is primarily responsible for hypnosis
   (2) Subject is primarily responsible for hypnosis

D. Involuntariness:

(1) Subject experiencing suggestions happening effortlessly

E. Subject Confidence:

(1) Length of time subject expects to be able to keep his or her hand in the water without hypnosis

F. Confidence in Hypnosis:

(1) Subject's confidence that hypnosis will be helpful to them in coping with pain

(2) Subject's belief that hypnosis can reduce pain

(3) Subject's desire to experience hypnosis

These questions were asked specifically as follows:

1. Suggestibility: "I would consider myself to be suggestible." (1-strongly disagree, 7-strongly agree)
2. Susceptibility: "I believe that I would be able to experience hypnosis." (1-strongly disagree, 7- strongly agree)
3. Hypnotist Control: "Going into hypnosis depends on the ability of the hypnotist, as opposed to the ability of the client." (1-strongly disagree, 7-strongly agree)
4. Special State. "Hypnosis is an altered state of consciousness quite different from normal waking consciousness." (1-strongly disagree, 7-strongly agree)
5. Normal State. "Hypnosis is a normal state of consciousness that simply involves the focusing of attention." (1-strongly disagree, 7-strongly agree)
6. Effort: "People who go into hypnosis easily, experience what the hypnotist is suggesting to them without consciously trying to make it happen." (1-strongly disagree, 7- strongly agree)
7. Subject Confidence: "I am confident of my ability to keep my hand in the ice water without hypnosis"? (1-strongly disagree, 7-strongly agree)
8. Confidence in Suggestions: "Suggestions given during hypnosis can significantly reduce or eliminate the experience of discomfort." (1-strongly disagree, 7-strongly agree)
9. Confidence in Helpfulness: "I am confident that hypnosis will be helpful to me in keeping my hand in ice water without much

discomfort". (1-strongly disagree, 7- strongly agree).

10. Willingness to Experience Hypnosis: "I would want to cooperate in experiencing hypnosis?" (1-strongly disagree, 7- strongly agree)
11. Desire to keep hand in the water as long as possible: "If I were in an experiment that involved measuring the length of time I was able to keep my hand in ice water, I would want to keep my hand in the water for as long as possible"? (1-strongly disagree, 7- strongly agree)

The post questions were as follows:

1. Effortlessness: "I spent little effort in keeping my hand in the water." (1-strongly disagree, 7- strongly agree)
2. Able to Experience Suggestions: "I was able to experience the suggestions made by the hypnotist" (1-strongly disagree, 7- strongly agree)
3. Resistance: "I resisted the suggestions made by the hypnotist." (1- strongly disagree, 7- strongly agree)
4. Usefulness: "The hypnosis was useful in helping me keep my hand in the water." (1-strongly disagree, 7- strongly agree)
5. Trance Experience: "I experienced a hypnotic trance." (1-strongly disagree, 7- strongly agree)
6. Experience Meeting Expectation: "My experience of the hypnosis was what I thought it would be." (1-strongly disagree, 7- strongly agree)
7. Other Verses Self-control: "My experience of hypnosis was determined by the hypnotist, and not determined by what I wanted." (1-strongly disagree, 7- strongly agree)
8. Authority: "The hypnotist was trying to convince me that I was having certain experiences." (1-strongly disagree, 7- strongly agree)

Research Questions and Analysis of Data

In Chapter II the research questions were specified. In this section the analysis employed in answering those questions will be presented.

Analysis of Variance

1. What are the effects on pain tolerance, pain report, distress, and heart rate of two approaches to modifying pain?

Analysis Number 1. A one-way analysis of variance was used to compare the mean scores of the treatment groups to the mean score of the control group on the dependent measures.

2 What are the effects of gender and two approaches to modifying pain on tolerance, pain report, distress, and heart rate?

Analysis 2. A one-way analysis of variance was used to compare the treatments by gender on the dependent variables.

3 How are the effects of subjects' beliefs in their hypnotic ability related to the dependent measures?

Analysis Number 3. A two way analysis of variance was used to compare the treatments by high and low hypnotic ability on the dependent variables.

In the analysis of the data a probability level of $p > .05$ was deemed necessary to support the hypotheses that the differences that exist occur a greater degree than what might be expected by chance.

Multivariate Analysis of Variance

The advantage of using MANOVA is that it increases the probability of not making type I errors, that is, accepting an alternative hypotheses when the null hypotheses is true. Secondly, MANOVA results adjust for correlations among the dependent measures. Merely doing a number of independent ANOVAs increases the probability of finding a significance merely on the basis of chance. Doing separate analysis of variance with dependent measures taken separately may not produce significant results. The ability of MANOVA to treat the dependent measures as a unit may produce results that would be missed in separate analysis of variance.

Following are the combined dependent measures that will be used in the MANOVA:

A Pain tolerance, distress, report, heart rate.

B. Post questions: 1, 2, 4, and 5. The rationale for this later grouping is the common element of experiencing a trance and finding it useful.

4. What are the effects of two approaches to modifying pain on the combined measures of tolerance, pain report, distress, and heart rate.?

Analysis Number 4. A multivariate analysis was used to compare the mean scores of the treatment groups on the combined dependent measures.

5. What are the effects of two approaches to modifying pain on the combined dependent measures of experiencing the suggestions effortlessly, resisting the suggestions, finding the treatments useful, and experiencing a trance?

Analysis Number 5. A multivariate analysis was used to compare the mean scores of the treatment groups on the combined dependent measures.

Multivariate Analysis of Covariance

Covariance was used to adjust the comparison group means to account for differences between the groups on the covariate. Mancova is employed on several dependent measures analyzed at the same time. There is no certainty that the subjects randomly assigned to the different groups will not differ on specific variables measured by the pre questions. These differences may have a significant influence on the dependent measures. As the purpose is to measure the effect of the treatments only the influence of differences on the intervening variables must be neutralized and MANCOVA is employed for that purpose.

MANCOVA will be run on the same dependent measures analyzed in the MANOVA with the following covariates:

A. Pre questions 1 to 11 (taken one at a time)

B. Pre questions 1, 2, 6, 8, and 9 (combined). The rationale for this grouping is the common element of belief in the effectiveness of hypnosis

6 What are the effects on pain tolerance, pain report, distress, and heart rate of two approaches to modifying pain when the all the variables in the pre questions are treated as single covariates. And what are the effects on the dependent measures of two approaches to modifying pain when subjects' belief in their hypnotic ability, belief in hypnosis as occurring effortlessly, and belief that hypnosis will be useful, are combined?

Analysis Number 6. A multivariate analysis of covariance was used to compare the mean scores of the treatment groups on the dependent measures employing the above mentioned covariates.

Correlations

Pearson Product Moment correlations will be calculated for all the variables. Specific correlations to note will be the subject variables with the dependent pain measures.

7. To what extent do subjects' beliefs in the hypnotist's control of the experience relate to their ability to modify pain?

Analysis Number 7. Pearson product moment correlations were taken on control with pain tolerance, pain report, distress, and heart rate.

8. To what extent do subjects' ratings of the effectiveness of hypnosis correlate with their ability to modify pain?

Analysis Number 8. Pearson product moment correlations were taken on effectiveness with pain tolerance, pain report, distress, and heart rate.

9. To what extent do subjects' belief in their confidence to tolerate pain with or without hypnosis relate to their ability to modify pain.

Analysis Number 9. Pearson product moment correlations were taken on confidence with pain tolerance, pain report, distress, and heart rate.

10. To what extent do subjects' expended effort relate to

their ability to modify pain?

Analysis Number 10. Pearson product moment correlations were taken on expended effort with pain tolerance, pain report, distress, and heart rate.

11. To what extent do subjects' beliefs in the usefulness of the treatment relate to their ability to modify pain?

Analysis Number 11. Pearson product moment correlations were taken on usefulness of treatment with pain tolerance, pain report, distress, and pulse.

12. To what extent do subjects' ratings of trance experience in terms of depth relate to their ability to modify pain?

Analysis Number 12. Pearson product moment correlations were taken on trance depth with pain tolerance, pain report, distress, and heart rate.

13. To what extent do subjects' ratings of their resistance relate to their ability to modify pain?

Analysis Number 13. Pearson product moment correlations were taken on resistance with pain tolerance, pain report, distress, and pulse.

Interview

The interview was designed to elicit responses about individual's subjective experiences during the hand immersion and the use of coping strategies. Subjects were initially asked to report any thoughts or feelings that they experienced while their hand was immersed in the ice water. They were then further asked to account for how they were able to keep their hands in the ice water for as long as they did.

IV RESULTS

In this chapter the results of the analysis will be presented. A preliminary analysis indicated that the individuals receiving treatment after a pre test differed significantly from the treatment groups without a pretest. Therefore treatment groups after pretest will not be combined with the later groups as the pretest had a significant effect on the subsequent treatment groups. An analysis will be done on these groups separately.

The design for the following data is as follows:

Figure 2. Design of Study. Treatment With No Pretest

R	X_1	O_1	X_1 = Direct Induction	N = 35
R	X_2	O_2	X_2 = Indirect Induction	N = 34
R	C_3	O_3	C = Control	N = 33
			O = Observation	
			R = Randomization	

The analysis will be presented along the following progression: one and two way analysis of variance, multivariate analysis, correlations, and descriptive statistics.

Analysis of Variance

The direct, indirect and control groups were compared on the four dependent measures: heart gain, time, report, and distress. Of particular note is the lower reports of distress and pain for the control group compared to the treatment groups, although nonsignificant. The variance on time was relatively large with all three groups having a variance of over 111 seconds.

Table 1

One Way Analysis of Variance Between Direct, Indirect, and Control Groups on Heart Gain, Distress, Pain Report, Time.

Variable	Group	Mean	S.D.	F (2, 99)	P
Heart	Direct	51.34	11.03	.65	.53
	Indirect	50.12	9.20		
	Control	48.58	9.80		
Report	Direct	56.26	9.90	1.87	.16
	Indirect	56.79	9.37		
	Control	52.73	8.67		
Time	Direct	154.60	111.99	.14	.87
	Indirect	141.27	116.68		
	Control	153.52	114.40		
Distress	Direct	4.20	1.94	2.96	.06
	Indirect	4.82	1.57		
	Control	3.82	1.59		

Histograms on Time

Figures 3 to 5 are histograms showing the numbers of subjects who were able to keep their hands in the water within specified time ranges. A visual analysis would support the findings that there are not significant differences between the groups on time and the dispersion of scores tends to be relatively similar.

Figure 3.Histogram on Time. Direct Group

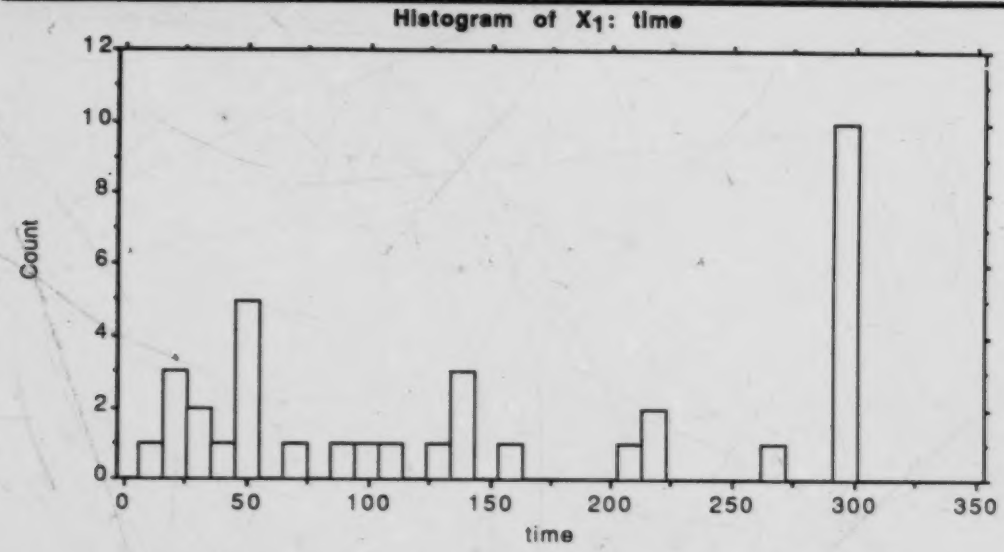


Figure 4.Histogram on Time. Indirect Group

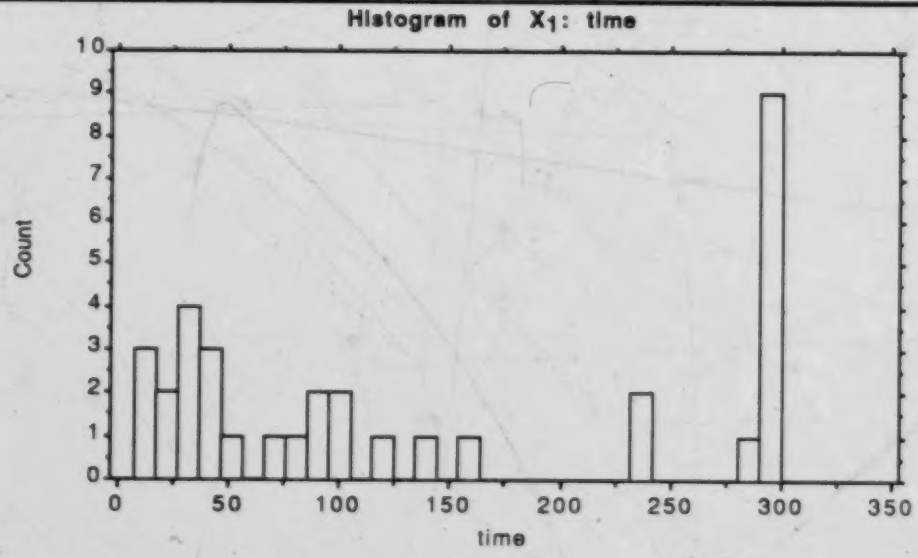
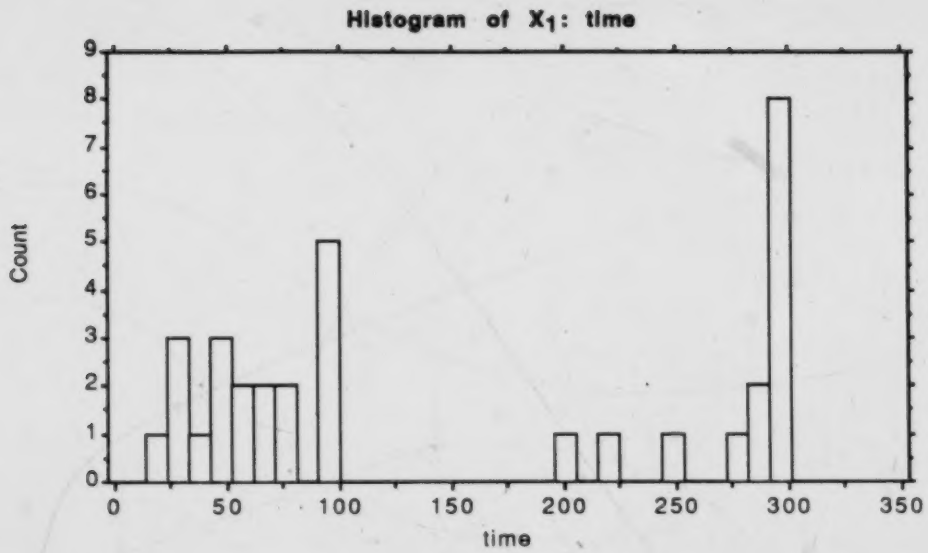


Figure 5.Histogram on Time. Control Group



Treatment Groups on Post Questions

Analysis was also done between the direct and indirect groups on the eight post question dependent measures. In Table 2 the results of the one way analysis of variance is illustrated with the means, standard deviations, F score, and probability. The only variable on which the groups were significantly different was on post six with the direct group expressing that their experience of hypnosis met their expectations to a higher degree than did the indirect group.

Table 2
One Way Analysis of Variance Between Groups on Post Questions

Variable	Group	Mean	S.D.	F (1, 67)	P
Post 1	Direct	3.51	1.75	.275	.60
	Indirect	3.29	1.73		
Post 2	Direct	4.74	1.59	2.32.	.13
	Indirect	5.26	1.21.		
Post 3	Direct	2.68	1.53	.01	.89
	Indirect	2.73	1.50		
Post 4	Direct	4.34	1.66	.07	.79
	Indirect	4.23	1.72		
Post 5	Direct	4.11	1.65	.35	.55
	Indirect	3.88	1.55		
Post 6	Direct	4.37	1.66	5.14*	.02
	Indirect	3.5	1.52		
Post 7	Direct	3.34	1.49	.34	.56
	Indirect	3.55	1.58		
Post 8	Direct	4.57	1.68	.44	.50
	Indirect	4.29	1.76		

A significant finding in the analysis to this point is that the treatment groups did no better on pain management measures than did the controls. Nor did the treatment groups differ on the post questions except for the direct group expressing that the hypnosis met their expectations more than the direct group. It would appear that both treatments are equally as effective and the subjects in both groups experienced the treatments in a very similar manner.

The following section on gender comparisons will serve to compare treatment groups to the control groups when analyzed by gender, as well as compare within treatment groups by gender.

Gender Comparisons

When subjects were separated by gender significant differences between the indirect condition and the control group were apparent. Table 3 illustrates that female controls did

significantly better on time and reported less distress than female indirect subjects. However, male indirect subjects did significantly better than male controls on time. There were no significant differences between the direct and control groups when separated by gender.

Table 3

One Way Analysis of Variance Between Female Indirect (N=22) verses Female Control (N=18) and Male Indirect (N=12) verses Male Control (N=15) on Dependent Measures

Variable	Group	Mean	S.D.	F (1,38) Fem. (1,25) Male	P
Time	Female Indirect	100.47	97.88	4.67*	.04
	Female Control	174.83	119.98		
Distress	Female Indirect	5.23	1.34	5.45*	.03
	Female Control	4.06	1.83		
Time	Male Indirect	216.08	114.52	4.31*	.05
	Male Control	127.93	105.59		

Note All nonsignificant comparisons on the dependent measures were omitted.

A separate analysis of variance was conducted on sex differences within each treatment group on the dependent measures. Table 4 illustrates that males in the indirect group reported significantly less pain, greater tolerance, and less distress than did the females. On the post questions males also reported that they spent significantly less effort in keeping their hands in the water and experienced a hypnotic trance to a greater degree than did females.

Table 4

Analysis of Variance Comparisons by Sex - Indirect Treatment on Dependent Measures. N = Males 12, Females 22

Variable	Indirect	Mean	S.D.	F (1, 32)	P
Time	Male	216.08	114..5	9.62*	.004
	Female	100.46	97.88		
Heart	Male	52.33	7.90	1.01	.31
	Female	48.90	9.79		
Report	Male	52.58	7.06	4.09*	.05
	Female	59.09	9.81		
Distress	Male	4.08	1.73	4.10*	.04
	Female	5.22	1.34		
Post 1	Male	4.17	1.53	5.32*	.03
	Female	2.82	1.68		
Post 4	Male	5.25	.87	7.73*	.009
	Female	3.68	1.84		

Note All nonsignificant comparisons on the post questions were omitted.

Table 5 shows that in the direct group there was a difference in sex on only one dependent measure with males expressing that they were able to experience the suggestions more than females.

Table 5

Analysis of Variance Comparisons by sex - Direct Treatments on Dependent Measures. N = Males 16, Females 19.

Variable	Direct	Mean	S.D.	F (1, 33)	P
Heart	male	51.13	11.92	.01	.91
	female	51.53	10.55		
Report	male	55.12	8.76	.38	.54
	female	57.21	10.90		
Time	male	179.19	107.36	1.44	.24
	female	133.80	114.43		
Distress	male	3.88	2.09	.83	.37
	female	4.47	1.80		
Post 2	male	3.94	1.73	9.34*	.004
	female	5.42	1.12		

Note. All nonsignificant comparisons on the post questions were omitted.

Table 6 illustrates that there are no sex differences in the control group on the four dependent measures.

Table 6

One Way Analysis of Variance Comparison by Sex, Control Group on Dependent Measures. N = Males 15, Females 18.

Variable	Control	Mean	S.D.	F (1, 32)	P
Heart	Male	45.67	8.02	2.55	.12
	Female	51	10.67		
Report	Male	50.40	6.72	2.05	.16
	Female	54.67	9.78		
Time	Male	127.93	105.59	1.39	.25
	Female	174.83	119.98		
Distress	Male	3.53	1.25	.88	.36
	Female	4.06	1.83		

In summary, the analysis on the influence of gender shows some significant differences that were not apparent when the groups were not separated by gender. In comparison with females in the indirect group, females in the control group did significantly better on time and reported less distress. However, males in the indirect group did significantly better than males in the control group on time. When a comparison was between gender within treatment groups, males in the indirect group did significantly better on the dependent measures than females. However these differences were not present in the direct group when compafed by gender. Clearly, the indirect treatment served to separate males and females while the direct treatment and control group did not.

Hypnotic Ability

Each treatment group was separated into high and low responders on belief in their ability to experience hypnosis on a seven point scale (lows 1-4, highs 6-7). This was done to determine if subjects' beliefs in their hypnotic ability would relate to their scores on the dependent measures. In general, self-described ability to experience trance had little relationship with the dependent measures. Table 7 illustrates that in the direct group high responders showed greater heart gain and higher agreement in experiencing a hypnotic trance.

Table 7.

One Way Analysis of Variance Comparisons by Hypnotic Ability, Direct Treatment on Dependent Measures. N = High 16, Low 9

Variable	Direct	Mean	S.D.	F.(1, 23)	P
Heart	high	52.81	9.02	5.32*	.03
	low	43.67	10.38		
Report	high	53.68	12.81	3.08	.09
	low	61.44	6.73		
Time	high	154.38	121.85	.07	.79
	low	140.66	118.60		
Distress	high	4.69	1.78	.10	.76
	low	4.44	2.00		
Post 5	high	4.81	1.33	9.75*	.005
	low	3.11	1.27		

Note. All nonsignificant comparisons on the post questions were omitted.

In the indirect group Table 8 shows that high ability responders differed from low ability with high responders indicating higher agreement in experiencing a hypnotic trance (post 5) and also experiencing less effort (post 1).

Table 8

One Way Analysis of Variance. Comparisons by Hypnotic Ability. Indirect Treatment on Dependent Measures. N = High 9, low 15.

Variable	Indirect	Mean	S.D.	F (1, 22)	P
Heart	high	55.22	10.60	2.46	.13
	low	48.67	9.49		
Report	high	60.67	8.52	2.14	.16
	low	54.87	9.86		
Time	high	146.56	125.11	.004	.98
	low	145.53	123.85		
Distress	high	4.89	1.70	.44	.52
	low	4.47	1.41		
Post 5	high	4.78	1.30	9.91*	.005
	low	3.00	1.36.		
Post 1	high	2.22	.97	5.50*	.03
	low	3.80	1.86		

Note. All nonsignificant comparisons on the post questions were omitted.

When the groups were combined a significant interaction effect may be observed as illustrated by Tables 9 and 10. Direct high ability subjects and indirect low ability subjects do equally as well on pain report. This finding is significant in that it lends support to suggestions rising from the literature that the indirect treatment is more effective for those who express a low ability to experience hypnosis.

Table 9

Two Way Analysis of Variance. High and Low Ability by Direct and Indirect Treatments on Pain Report.

Anova table for a 2-factor Analysis of Variance on Y_2: report

Source:	df:	Sum of Squares:	Mean Square:	F-test:	P value:
treat (A)	1	.459	.459	.005	.9465
ability (B)	1	10.899	10.899	.108	.7436
AB	1	523.041	523.041	5.196	.0274
Error	45	4529.393	100.653		

Table 10

Means and Sample Size. Treatment by Hypnotic Ability on Pain Report

The AB Incidence table on Y_1: report

	ability:	high	low	Totals:
treat	direct	16 53.688	9 61.444	25 56.48
	indirect	9 60.667	15 54.867	24 57.042
Totals:		25 56.2	24 57.333	49 56.755

In summary, the analyses on subjects' belief in their ability to experience trance indicates that for both treatment groups those with high ability beliefs reported that they experienced a trance to a greater extent than did low ability responders. Interestingly however, this did not transfer over into lower pain measures. That is, subjects who were confident of their ability to experience a trance, did no better on pain measures than those who were not confident

An interaction analyses showed that low ability subjects in the indirect treatment did as well as the high ability subjects in the direct treatment on pain report and thus supporting the contention of indirect hypnosis as especially effective for subjects with little confidence in their ability.

Multivariate Analysis of Variance

Table 11 illustrates the results of the MANOVA comparing three groups on the combined dependent variables of (1) time, heart rate, pain report, and distress. Only the direct and indirect groups were compared on the second set of dependent variables: (2) post questions 1, 2, 4, 5. For both combined sets the over all F was nonsignificant and the univariate analysis did not produce any results of significance. In all MANOVAS that follow, Wilks' lambda was used to test the null hypotheses.

The rationale for the first set of dependent variables as a unit is based on previous research showing a correlation between the variables. As well, common sense would suggest that these variables may be related. For example the longer one keeps his of her hand in the water, the less pain would be experienced. The correlation on these two variables is illustrated in tables produced later in this chapter. The grouping of the second set of dependent variables comes as a result of these variables having the common element of suggesting first, the experiencing of the hypnotic induction and secondly, experiencing that induction as useful. The table on correlations will also serve to bear these assumptions out. The reader may wish to turn to these tables now for a cursory analysis.

Table 11

MANOVA Followed by Univariate Analysis of Variance Comparing Treatment Groups on (1) Time, Heart Rate, Report, Distress (2) Post 1, 2, 4, 5.

	F	P
MANOVA (1)	1.23	.29
Time	.14	.87
Distress	2.96	.06
Report	1.87	.16
Heart	.15	.53
MANOVA(2)	.92	.46
Post 1	.27	.60
Post 2	1.89	.17
Post 4	.07	.79
Post 5	.36	.55

The results indicate that the MANOVA did not produce results of any significance that was not already apparent from the one way analysis of variance.

Multivariate Analysis of Covariance

When a MANCOVA was carried out, the dependent measures of time, distress, heart and report were combined in a comparison of the direct and indirect treatment groups. The eleven pre questions were the covariates. These were treated separately and also grouped on the following basis: 1, 2, 6, 8, 9. This grouping of covariates was made because first, they suggest that hypnosis will be experienced and secondly, that it will be useful.

The result of the overall MANOVA on all dependent measures with the covariates taken out, was nonsignificant. The univariate analysis with the covariates taken out was also nonsignificant. These findings support the results of the previous statistical analysis which also produced findings of non significance when

comparing the indirect group with the direct group on the dependent measures.

Correlations

Pearson product moment correlations were calculated on all the variables for the combined direct and indirect groups. For the sake of brevity, only those correlations which are statistically significant and relevant to the research questions will be discussed. The correlations are reproduced in Tables 12 to 17.

There is a significant difference in sex in relation to the dependent variables. Females reported more pain ($r = .216$, $p > .05$), more distress ($r = .254$, $p > .025$), and less tolerance ($r = -.344$, $p > .005$).

Subjects' belief in their ability to experience hypnosis was correlated with gain in heart rate ($r = .335$, $p > .005$) but no other correlations with the dependent measures were significant.

While subjects' confidence in hypnosis was not significantly correlated with the dependent measures, subjects' confidence in keeping their hands in the water without hypnosis was significantly correlated with pain report ($r = -.381$, $p > .005$) and tolerance ($r = .321$, $p > .005$).

Subjects' efforts in keeping their hands in the water was positively correlated with the dependent measures: as pain report increased effort increased ($r = .336$, $p > .005$), and as distress increased effort increased ($r = .234$, $p > .025$).

Subjects' statements on how useful hypnosis was to them, was significantly correlated with pain report ($r = -.442$, $p > .005$) and with tolerance ($r = .517$, $p > .005$).

Experience of a trance was significantly correlated with tolerance ($r = .235$, $p > .025$). That is, those who believed that they experienced a trance tended to keep their hands in the water longer

Belief that the hypnotist was trying to convince them that they were having specific experiences was correlated with subjects increase in heart rate ($r = .303$, $p > .01$).

Tables 12-17

Pearson Correlation Matrix on Pre Questions and Dependent Measures on Combined Treatment Groups. N = 69

Correlation Matrix for Variables: X_1 ... X_{27}

	sex	age	hyp	heart gain	report	time	distress	pre 1
sex	1							
age	-.13	1						
hyp	-.089	-.212	1					
heart gain	-.074	.126	-.035	1				
report	.216	.052	-.146	-.179	1			
time	-.344	-.046	.119	.154	-.621	1		
distress	.254	.126	-.068	-.074	.273	-.268	1	
pre 1	.048	-.1	-.098	.147	-.087	.083	.031	1
pre 2	-.01	.039	-.282	.335	-.118	.085	.051	.455
pre 3	-.119	-.101	.297	-.1	-.092	.07	.022	.098
pre 4	-.055	.106	.297	-.013	-.022	.132	.172	-.085
pre 5	.184	-.07	-.165	.112	.149	-.161	.045	.002
pre 6	-.045	.183	-.105	.073	.015	-.014	-.066	.089
pre 7	-.195	-.082	.238	-.098	-.381	.321	-.023	-.09
pre 8	-.254	.148	-.024	.183	.011	-.052	-.017	.078
pre 9	-.332	.158	-.024	.141	.122	.04	.053	-.096

Table 13

Correlation Matrix for Variables: X_1 ... X_{27}

	sex	age	hyp	heart gain	report	time	distress	pre 1
pre 10	-.113	.054	-.037	.142	.053	-.052	-.048	.175
pre 11	.053	-.083	.216	-.067	-.253	.165	.004	.033
cred	-.03	-.062	-.226	.205	.001	-.126	.043	.252
post 1	-.062	-.017	.097	-.052	-.366	.176	-.234	.187
post 2	.373	-.184	1.50E-19	-.317	.024	-.124	.311	.196
post 3	-.121	.055	.196	.03	-.045	.075	-.087	.013
post 4	-.139	-.299	-.027	.107	-.422	.517	-.158	.062
post 5	-.141	-.152	-.306	.041	-.184	.235	-.008	.293
post 6	.097	.002	-.267	.084	.017	-.143	.171	.179
post 7	-.008	-.102	.013	-.028	-.047	-.025	.056	.007
post 8	-.17	.116	.105	.303	.054	-.059	.009	.153

Table 14

Correlation Matrix for Variables: X_1 ... X_{27}

	pre 2	pre 3	pre 4	pre 5	pre 6	pre 7	pre 8	pre 9
pre 2	1							
pre 3	-.101	1						
pre 4	-.182	.286	1					
pre 5	.276	-.246	-.653	1				
pre 6	.007	.169	.226	-.249	1			
pre 7	-.022	.088	.157	-.325	-.031	1		
pre 8	.175	-.114	.051	-.077	.266	-.079	1	
pre 9	.179	-.084	.019	.087	.094	-.042	.664	1

Table 15

Correlation Matrix for Variables: X_1 ... X_{27}

	pre 2	pre 3	pre 4	pre 5	pre 6	pre 7	pre 8	pre 9
pre 10	.502	-.053	-.062	.121	.124	-.005	.293	.324
pre 11	.13	.324	.228	-.284	-.07	.412	-.06	.051
cred	.543	-.095	-.275	.242	.026	-.06	.376	.256
post 1	-.023	.155	-.031	-.085	-.053	.261	-.207	-.175
post 2	-.016	.255	.051	.007	-.094	-.083	-.093	-.289
post 3	-.223	-.031	.008	-.027	.019	.044	-.132	.049
post 4	.226	.262	-.045	.069	.051	.217	.01	.033
post 5	.536	.097	-.142	.095	.039	.032	.038	-.024
post 6	.307	-.051	-.37	.335	-.041	-.148	.026	.066
post 7	-.135	.042	-.061	-.047	.069	.064	-.111	-.3
post 8	-.121	.2	.006	-.103	.161	-.113	.198	.136

Table 16

Correlation Matrix for Variables: X_1 ... X_{27}

	pre 10	pre 11	cred	post 1	post 2	post 3	post 4	post 5
pre 10	1							
pre 11	.048	1						
cred	.443	.014	1					
post 1	-.129	.363	-.005	1				
post 2	-.076	.166	-.096	.1	1			
post 3	-.409	.075	-.198	.158	-.231	1		
post 4	.007	.309	.085	.282	.177	-.065	1	
post 5	.252	.133	.428	.053	.173	-.305	.492	1
post 6	-.056	-.081	.254	.065	.125	-.179	.086	.296
post 7	-.187	.099	-.011	.124	.181	.051	.12	.12
post 8	-.058	-.115	.019	-.045	-.191	.021	-.034	-.048

Table 17

Correlation Matrix for Variables: X_1 ... X_{27}

	post 6	post 7	post 8
post 6	1		
post 7	.244	1	
post 8	.066	.059	1

Results of Interview

The questions in the interview were designed to elicit from the subjects information about what they were thinking, feeling, or experiencing while their hands were immersed in the ice water. The results were analyzed for the following criteria: catastrophic thoughts and self-statements (eg. swimming in freezing water), coping strategies (eg. breathing deeply), altered states (eg. floating), and reports of feeling relaxed. The subjects were also asked how they would "account" for keeping their hands in the water for the length of time they did. Specific themes emerged in response to these question.

While some subjects reported only one category of response, others reported a mixture, for example, both coping and catastrophic self-statements. Table 18 illustrates the category of response and the frequency for each group. Some notable figures indicate that the control group relied more on will power and curiosity in their accounts of how they were able to keep their hands in the water. The control subjects reported no instances of altered states while six subjects in the treatment groups mentioned experiencing altered states. As was expected, the treatment groups also reported more instances of feeling relaxed.

Table 18
Techniques and Experiences Reported by Subjects in Interview

	Direct	Indirect	Control	Total
Challenge:				
1. Will power	4	2	7	13
2. Curiosity	3	2	6	11
Total	7	4	13	24
Strategy:				
1. Waiting for next "report"	2		1	3
2. Deep Breathing	2	2		4
3. Self-Statements	5	2	5	12
4. Reinterpretation	3	3	1	7
5. Distraction	5	4	7	16
6. Dissociation	3	6	3	12
Total	20	17	17	54
Catastrophic thoughts and self-statements	11	12	8	31
Altered States:				
heavy	1			1
amnesia	1	1		2
floating	4			4
hallucinating		1		1
Total	6	2		8
Statements of feeling relaxed:	5	8	2	15

Further analysis was carried out using the following design:

Figure 6. Design of Study. Pre Test Followed by Treatment.

R	C_1	0_1	X_2	0_2	R = Randomization
					0 = Observation
R	C_3	0_3	X_4	0_4	X_2 = Direct treatment N = 16
					X_4 = Indirect treatment N = 17
					C_1 = Control N = 16
					C_3 = Control N = 17

The data from this study was analyzed from the perspective of discovering subjects' experiences with and without hypnosis. This present analysis differs from the previous design due to the fact that each individual had a chance to experience both control and treatment conditions and was therefore able to provide a comparison.

A statistical analysis between the treatment and control groups was not conducted because of significant features in the design. For example, the pretest may confound the effects and make it impossible to isolate the effects of the treatment only.

Table 19 represents the frequencies of specific statements of subjects comparisons of the control and treatment conditions. The first item presents some interest as four people reported that the treatment experience was more painful than the control condition. Also of particular note is the response from four subjects that they felt the treatment was detrimental to their ability to manage the pain. One individual reported that she felt pressure not to try to actively manage the pain in the treatment condition. Fifteen subjects reported natural and effortless experiencing, and three reported experiencing the same sensory experience but less distress in the treatment group compared to the control group.

Table 19
Comparison Between Control and Treatment Conditions. N = 35

	Statement	Frequency
1.	Hurt more in treatment condition	4
2.	Hurt more in control condition	1
3.	Treatment detrimental to pain management	4
4.	Felt pressure not to actively manage pain in treatment condition,	1
5.	Treatment condition was natural and involved little effort as compared to the control condition.	15
6.	In treatment condition experienced pain but considerable less distress.	3
7.	Treatment condition promoted use of coping strategies.	1

The results of the interviews revealed some answers to these questions that would have been missed if reliance was only on the pre set designed questions. One individual, when questioned how she would explain doing better in the control condition as opposed to the treatment condition, answered in the following manner.

> I couldn't control the pain as much as the first time. I would have relaxed more if I could have handled it the way I did the first time. I felt pressure that I shouldn't do anything - that I shouldn't take full control.

Similar responses were reported by three other subjects who had both conditions. One individual reported that the self-initiating strategies she used in the control condition were relatively successful. However when she attempted to go with the suggestions initiated by the hypnosis, she attempted to use both strategies which was ineffective and confusing. She decided to return to her self-initiated strategy.

Another counter effect of the treatment resulted when some subjects reported that they were so relaxed as a result of the hypnosis that they did not have the same self-control to deal with the pain.

V Discussion

Discussion of Results

In this chapter the results of the study will be discussed as they relate to the research questions. Suggestions for further study, implications for therapy, and a summary of the findings will close the chapter.

The initial question was to determine how the treatment groups and the control group may have differed on the dependent measures. There was no significant main effect difference between the groups on any of the dependent measures. Somewhat surprisingly, the control group had lower mean scores, although not significant, on the measures of distress, and pain report compared to the treatment groups. Beach (1981) reported similar results of a control groups better performance on distress and pain report in a study on cognitive treatments for pain control.

The scores of the control group relative to the treatment groups in this study, present interesting questions about the utility of hypnotic treatments for pain management and also about the function of control groups in experimental designs.

Not to be overlooked, is the possibility that the hypnotic treatments did not work. There are a number of plausible reasons for this result: (1) The subjects may have been too anxious about experiencing hypnosis and the immersion into the ice water, to sufficiently relax to a point where hypnosis could be effective. (2) The length of the inductions may have been too short to sufficiently induce the necessary hypnotic experience. (3) Hypnosis, regardless of type of induction may only be effective for that minority of the population who have the necessary hypnotic ability. As the subjects in this study were not selected on their hypnotic ability, it is suspected that the majority did not have the characteristics necessary to experience hypnosis. (4) The indirect induction in this experiment was devised by Joseph Barber and it may be that his reported success with this induction is specifically related to his style and personality.

In a review of the literature it was observed that outcomes in

hypnotic experiments may be to a degree, a function of demand characteristics. The function that these responses may play in the non significant results are worth considering. Part of the explanation for these findings may arise from attempts by individuals in the hypnotic treatments, to be "good" subjects and not actively enact pain coping strategies as they believed doing so would "ruin" the hypnotic treatment and thereby disprove what they assumed to be the experimenters hypothesis.

The literature has also shown that volunteers frequently respond to implicit demand characteristics as a desire in some manner, to contribute to human welfare in general (Orne, 1962). An alternative view attributes role behaviors to expectations of obedience to authority.(Kelman, 1972). A third view implies that role behaviors may be a function of subjects' heightened approval needs in response to evaluative expectations that are endemic to behavioral research participation. Rosenberg (1965) hypothesized that the typical subject enters into the experiment with the expectation of being evaluated on some psychological dimension and guides his or her behavior accordingly. Still another explanation, suggests that volunteering induces self-justification in cooperating in order to justify the time and effort expended. It is not clear to what degree any one or combination of the above motivators may have been active in the present study.

A factor of demand characteristics that may have been critical in this study may have been the issue of anonymity. Several studies (e.g. Silverman,1968) report that anonymous subjects are less compliant with demand characteristics than subjects who can be individually identified by the experimenter. In this study the experimenter administered all pre test questionnaires and the subsequent treatments. Taken together, subjects could have felt some apprehension about being evaluated and thereby skew the results in some unknown direction.

While the influence of demand characteristics in this study can only be inferred, there is some evidence that they were present as artifacts. Transcripts from the interview indicated that some treatment subjects did not use their pain coping strategies to the

full extent because they believed that self-initiated strategies would alter the effect of the hypnotic treatment. Some subjects even expressed concern about doing anything such as employing coping strategies, that might ruin the effect of the hypnotic treatment. Ironically, the literature suggests that it is the employment of these coping strategies that makes hypnotic analgesia successful.

Not all findings however, can be described as responses to demand characteristics. Other responses revealed that the relaxed feeling hypnosis produced made coping strategies too difficult to enact. And another response indicated that the hypnotic analgesia may have reacted detrimentally with some subjects' usual way of coping because of the confusion of what skills to employ, that is, their own or that suggested by the hypnosis. It may be that with practice subjects will not see the approaches as incongruent but rather conceive hypnosis as aiding self-initiated strategies relatively effortlessly.

The poor results of the treatment groups relative to the control group may also be considered in light of Bandura's (1977) observation that when individuals are asked to report on the effectiveness of an intervention they are likely to respond from the view point that the treatment is to operate independently with little or no input from the individual. Frequently, this is based on wishful thinking and faith in the therapist and treatment and tends to be counter productive as it dissuades the individual from using his or her own coping skills.

Spanos and others have shown that some success in hypnotic analgesia requires the active employment of coping strategies. If the hypnotic subjects were convinced that they were to be largely inactive in producing these strategies then the treatments are likely to fail. However, if the subjects have sufficient ability to dissociate they then would of course, not find it necessary to use cognitive coping methods. It would appear that few of the subjects in this study had the ability to dissociate with relative ease.

While the hypnotic subjects were frequently actively coping, the control subjects were not completely passive in their attempts

to manage the discomfort of the ice water. A number of subjects had well developed strategies and used these more or less effectively. Frequently, individuals in the control condition acted upon a self-challenge to keep their hands in the water. Some prompting in this regard may have come from the author as he was clear to express that they were to try to keep their hands in the water for as long as possible. However, they were also informed along with all subjects, that withdrawing their hand was entirely their prerogatve and in no way would an "early" or "late" withdrawal unduly effect the results of the study. The author was conscious of not telling the subjects that they should employ some sort of strategy. Similar to the findings of Spanos et. al. (1984) control subjects did enact strategies without prompting from the experimenter.

It also became apparent that some individuals responded to the experimental conditions by "guessing" what they thought were the unstated expectations of the author. One subject, after becoming physically ill because of her response to the pain and stress, when questioned why she did not take her hand out sooner if she was feeling that stressed, responded that she did not want to "ruin" the experiment. It is probable that other subjects reacted in the same manner although it is difficult to determine in what direction these behaviors may have influenced the results.

When gender was introduced in the combined hypnotic conditions, males reported significantly less pain and distress. This finding supports previous findings that males generally respond to pain differently than females. The gender differences were especially apparent in the indirect group where males not only did better on pain, distress and tolerance but also reported spending less effort in keeping their hands in the water as well as experienced a trance to a greater degree than females. The observation that there were no sex differences in the control condition would suggest that it is a factor of the induction that produces the difference. Males may do better in an indirect induction because of the permissive nonauthoritarian aspect of the induction as compared to the apparent "challenge" characteristic of the direct induction.

The other aspect to consider is the fact that the author is male and there may be a cross sex influence. However, if this influence was significant, one would also expect it to show up in the direct group as well. Sex differences are unlikely to be solely a result of the "macho" effect because males expressed both spending little effort and also reported that the hypnosis was useful. Males did not express any difference compared to females in terms of being more or less under the influence of the hypnotist. If males had expressed that their experience was determined by themselves rather than the hypnotist, then some credibility could be given to attributing males superior performance to their own activities as opposed to the treatment effect. In general, the evidence points to the influence of the indirect treatment, specifically for males.

There was a partial relationship between subjects' reports of hypnotic ability and the dependent measures. In this study individuals rated themselves as to their ability to experience trance. In both the indirect and direct groups, high susceptibles differed from low susceptibles only in terms of high susceptibles reporting that they experienced a trance to a greater degree than the low susceptibles.

As with previous research, the findings here indicate that there is a significant relationship between susceptibility and trance experience. However, this did not translate into reduced pain. There was no difference between high and low susceptibles on the pain measures, with one exception. In the direct group high ability subjects report a significantly higher heart rate than the low ability subjects. This may be due to the anticipatory arousal of entering trance.

The observation that high ability subjects scored higher heart rates deserves further explanation It may seem paradoxical that those individuals who claimed to have experienced hypnosis are also those who showed the most heart gain. There are two possible explanations for this. First, maintaining hypnotic analgesia requires some effort and may involve some anticipatory excitement (Hilgard & Hilgard, 1983; Sarbin & Slagle, 1979). Secondly, very few of the subjects had been hypnotized before, and it would be reasonable to

suspect that some anxiousness was incurred as they prepared themselves for an experience that they were willing to experience but not without some trepidation. The self-defined low susceptibles however, may not have experienced the same excitement as they did not experience the alterations in consciousness that may be synonymous with hypnosis.

One of the most significant variables in predicting success on the pain measures was the individual's confidence in his or her ability to cope with the ice water, irrespective of hypnosis. The correlation of self efficacy with pain report and time was significantly high. However, individuals confidence in the credibility of the induction was not a relevant factor. Girodo and Wood (1979) and Bandura (1977) report that expectations about the utility of the treatment is what determines its success because expectations promote coping behavior. However, self-efficacy in this case operated independently from expectations of the intervention. That is, individuals reports of self-confidence were not related to their confidence in the efficacy of the treatment

The factor of confidence was apparent in other relationships as well. Self-efficacy or self-confidence in tolerating the ice water without hypnosis, was related to a desire to keep their hands in the water for as long as possible. Desire to cooperate in experiencing hypnosis was also significantly correlated with a decreased pain report which again emphasizes the importance of desire and self-confidence regardless of the intervention.

The question about effortless experiencing was included because hypnosis is thought to "happen by itself" with little effort. The treatment groups did not differ on the amount of effort experienced in keeping their hands in the water. Over all, effort decreased as pain report decreased, and decreased as distress decreased.

Significantly, treatment subjects used coping strategies but they frequently reported less effort than the controls in doing so. This can probably be attributed to the phenomenon of effortless experiencing characterizing hypnosis. It would seem then, that controls and treatment groups used coping strategies equally

effectively, but the treatment groups did so with less effort as an effect of the hypnotic treatment.

Effort was also related to the usefulness of the treatment. As persons reported less effort in keeping their hands in the water, reports of finding the treatment useful correlated positively. This further supports hypnotic analgesia as effortless experience.

It is important to note that hypnotic subjects often reported feelings of relaxation and it may have been this experience that led to reports of the strategies being relatively effortless. Subjects reports of the usefulness of hypnosis did not negate their use of coping strategies. Because a subject claims that hypnosis was helpful does not mean that self-initiated strategies were not employed.

One rationale for the alleged effectiveness of indirect as opposed to direct inductions is the characteristic of the former to prevent resistance. The argument put forth by Barber (1977) and others concerning the greater efficacy of indirect inductions in dissipating resistance was not confirmed. There was no difference between the direct and indirect groups on self-reports of resistance to the hypnotic suggestions.

Another rationale of the effectiveness of the indirect induction is its alleged ability to give the subject an experience of maintaining control. The question concerning subjects' belief that their experience was self-determined rather than hypnotist determined was designed to discover if the direct group would answer more positively to the later condition as suggested by the apparent authoritarian style of the direct induction. The results did not confirm the hypothesis. There was no difference between the groups. Subjects did not regard the hypnotist in the indirect condition as any less controlling than in the direct condition in spite of efforts in the indirect treatment to avoid any suggestion of control.

As well, individuals success in experiencing a trance and success on pain measures was not significantly attributed to the persons own efforts nor to the hypnotist. Interestingly however, there was a relationship between belief that the hypnotist was

trying to convince them, and heart rate. Apparently, this may have incurred greater arousal resulting in an increased heart rate.

The techniques and experiences the groups reported while their hands were in the water are generally understandable in respect to the context of the particular group. Control group subjects may have relied more on will power and curiosity in accounting for their ability to leave their hands in the water. The treatment groups tended to report coping strategies such as deep breathing, attempting to relax, making positive self-statements, and attempts at distraction. Similar to the findings of Spanos, the controls also used cognitive coping strategies in an apparently self-initiated manner. It was difficult to determine the relative success of a strategy for any group or the amount of time any strategy was used. This was particularly difficult in the hypnotic groups because frequently these subjects experienced an altered time orientation and found it difficult to give approximations.

An important difference was apparent however, as the hypnotic groups reported more instances of what were interpreted as dissociations. This was to be expected as a result of the treatment. To what extent these were spontaneous dissociations is not known. Subjects may report spontaneity but there may be a degree of disavowal. Hypnosis gives directives for specific experiences under the assumption that these are to happen involuntarily. Consequently, subjects may apply effort but claim an involuntary response.

Neither induction gave any suggestion of employing coping skills and the appearance of these strategies appears to be a self-initiated action. There is no evidence to suggest that these strategies would not appear without hypnosis. The control group reported an approximately equal frequency of similar strategies used by the induction groups. Hypnosis in this study did not provide subjects with skills they did not already possess. The hypnosis appeared to make the use of these strategies effortless but did not create them.

Implications for Theory

Considerable discussion has taken place among therapists and researchers as to the effectiveness of a direct verses an indirect induction. This research was undertaken to compare the two approaches and to search for variables that would both describe and perhaps offer some explanatory concepts of the hypnotic experience in general and specifically, hypnotic analgesia. In this section a brief statement of the therapeutic rational of the inductions will be given. The major implications from the study will address some of these theoretical issues.

The direct induction achieves its title primarily because of the directive nature of the suggestions. Subjects are simply told that they are to experience a specific event such as "you are feeling relaxed". Successful individuals are described as being hypnotizable which is an indication that subjects are willing to cooperate and to experience the suggestions effortlessly. The induction is given in a standardized manner and the individual is given relatively little choice in how to experience the suggestions.

The indirect induction has gained its name from the nondirective nature of the suggestions. The subject is led to believe that the hypnotic experiences are occurring naturally and not on the authority of the hypnotist. For example, the indirect therapist might say "you may wonder if you will feel more relaxed now or in a minute or two". A critical feature of the induction is its assumed ability to prevent resistance to trance that might be apparent with a direct induction. The individual is given a choice as to how to experience the suggestions. The indirect method is considered to be more effective than the direct method on subjects who are resistant to experiencing hypnosis.

Neither of these treatments were more effective than a control group on measures of pain experience. However, there was a difference between the two treatment groups. Subjects in the indirect group who reported low confidence in their ability to experience trance and low confidence in the effectiveness of hypnotic analgesia did just as well as high confidence subjects in the direct group on the same two variables, in terms of pain report.

The effectiveness of the indirect induction relative to the direct induction for those subjects who have low self-confidence and little confidence in hypnosis is confirmed. However, the rationale for this effectiveness was not confirmed, as there was no difference between the two treatment groups in terms of their reports on resistance and control. That is, indirect subjects did not report less resistance to the suggestions nor did they report finding the hypnotist any less controlling. The reason for the difference is not clear.

A difficulty in looking for this and other explanations involving hypnotic phenomena is the apparent involuntary and unconscious aspect of the experience. Hypnosis can involve dissociation and the relegating of conscious cognitions to a secondary category, and may lead to an inaccurate account of the actual experience. In other words, asking subjects to consciously report on something that may occur unconsciously may distort the reality of the event. This brings into question the validity of self-reports in terms of accounting for the hypnotic phenomenon.

The second difficulty is that hypnotic subjects may not conceive of hypnotic resistance and control in the same manner as the theorists. The rationale as conceptualized by the theorist may not explain the subjects' experience. For example, how does a subject characterize his or her response to hypnosis if they do not know what it is and have had no prior experience? In terms of hypnosis researchers may need to rely more on subjects descriptions of their phenomenlogical experiences without trying to impose their own categories on the subjects' accounts.

Another significant finding relevant to theory is the indication that self-confidence in coping with the stressor regardless of treatment is one of the most salient indicators of successful pain management. This self-efficacy seems to derive from the individuals past experiences in general and is not solely a function of hypnosis.

Interesting implications for theory also arise in consideration of hypnosis as a dissociated state. The majority of subjects in this study did not experience what might be described as dissociation but

rather actively engaged in coping strategies in a planful manner. The question remains however, as to what degree dissociation may have been involved with these purposeful strategies. Individuals often reported effortlessness in coping but this may also have been a function of the demand features of hypnosis where the suggestion is implied either explicitly or implicitly that effort will be disavowed.

Following Hilgard, it might be profitable to attempt to discover if there is a "hidden observer" present in the hypnotic individual that is actively managing the hypnotic experience but is dissociated from awareness. Subjects therefore, may have experienced considerable effort in producing the coping strategies but were dissociated from the effort.

Finally, how does this study contribute to the theory of hypnosis as a social psychological process involving the role playing of hypnosis. This is a difficult question to answer because it is possible to become so engaged in a role that physiological and other experiences of hypnosis may appear apparently nonvolitionally.

Some indication of the effect of role playing may be found in relationship between motivation and hypnotic outcomes. In this study individuals who considered themselves to have the ability to be hypnotized, who wanted to cooperate in experiencing hypnosis, and who found that treatments credible, reported that they experienced a trance. This would suggest that motivation is a significant element of hypnotic experience and if the motivation is strong enough the individual may "go along" with the suggestions as though they are happening effortlessly. A pragmatic view would claim how one enters trance is of little relevance as long as the effects are experienced. However, it is clearly to the therapist's advantage to appreciate that hypnosis may depend significantly on role playing features and these can be used as critical elements in setting up the conditions for trance to occur.

Suggestions For Further Research

The results of this study have led to some possibilities for further research. The study was designed to examine certain variables within the context of an experimental design. Other

designs, populations, and questions could well provide further relevant material.

1. The subjects in this research were all volunteers who had ultimate control over the stressor by simply withdrawing their hand. It is unknown what effect the hypnotic interventions would have on a clinical population and specifically those with chronic pain. Comparing the hypnotic inductions on dental or chronic head ache patients for example, could provide relevant information about the effectiveness of the inductions.

2. Milton Erickson reports that proficiency with hypnosis comes after repeated practice for both the therapist and the client. In this study this was the first exposure subjects had to hypnosis and it is unknown how training in hypnosis would alter the findings found in this study. Other studies could train subjects over a period of time and compare the results of the two inductions on pain measures.

3. The individuals in this design were required to report their level of comfort every thirty seconds. There was some degree of frustration expressed by some of the subjects because they had to interrupt their experience of trance or coping strategies to attend to the question and produce an answer. If subjects were allowed to attend to the experience without interference their attempts at coping could have been more effective. Other studies could be designed with more non intrusive requirements for measurements of discomfort.

4. A number of subjects had developed useful coping strategies. Further study might investigate how hypnosis could be used in conjunction with techniques already proven effective. The therapist may adapt the hypnotic suggestions knowing the client's preference for specific coping strategies or even take some time to train the subject in strategies before these are applied in the hypnotic context. For example, if distraction is a method of choice then the therapist may suggest in the induction, effortless and creative ways to enhance that ability.

5. One subject after removing her hand from the ice water informed the experimenter that she wished that he would have told

her that her hand was numb while it was in the water. Other research might investigate the effectiveness of hypnotic suggestions for analgesia concurrent with the pain test.

6. This study dealt specifically with cognitive strategies of pain management. However, some subjects may have used physical means of coping such as clenching of teeth and tensing of muscles. While none of the subjects reported using these techniques, perhaps some effort should be made to discover to what extent they were employed and if they were useful.

7. The experimenter conducted all aspects of the experimental procedures. Anonymity was therefore not assured and as a result, subjects may have skewed their responses out of concern that they were going to be evaluated on some assumed psychological variable. The effect of the treatment variables may have been clearer if another experimenter had administered the hypnotic intervention.

Implications for Therapy

The study was designed to gain insight into the variables of hypnotic analgesia. The results have implications for therapists and others dealing with hypnosis and pain, as well as some considerations for therapists working with a more general population.

1. There may a tendency for therapists to assume their clients are deficient in coping with their problems and the intervention employed by the therapist is better than the individual's own efforts. The results of this study point out the importance of clarifying with the client what solutions they have tried, in what ways have they been successful, and what recommendations the client has for assistance from the therapist. Therapeutic interventions could be designed that are congruent with the clients own abilities.

2. Expectations about the treatment and clients' interpretation of the problem can guide the therapeutic intervention. Emphasis could be given to raising the client's expectations for success by attempting to communicate as clearly as possible the credibility of the intervention not only generally, but for that individual

specifically.

3. A personal sense of confidence in one's own abilities is a critical variable in therapeutic success. The therapist could take some time to raise their client's belief in their own ability to manage the stressful situation and encourage the client to be an active participant.

Summary of Findings

In this last section a summary of the most salient features of hypnosis in relation to pain management will be presented as they pertain to this study.

1. Hypnotic treatments were no more effective than a control on the measures of heart rate, time, pain report, and distress.
2. Subjects in all groups tended to employ cognitive coping as self-initiated strategies. Hypnotic subjects reported less effort and greater relaxation than the controls in employing these strategies although they were no more effective.
3. There was a significant difference on the dependent measures when sex was chosen as a variable. In the combined treatment groups males reported significantly less pain and longer tolerance. When the groups were analyzed separately by sex, males in the indirect group reported significantly more tolerance, less pain, less distress, greater effortless experiencing, and greater agreement that hypnosis was useful to them. There were no gender differences in the control group on heart rate, pain report, time or distress.
4. High hypnotic ability responders differed from low responders. High ability subjects in both treatment groups reported that they experienced a trance to a greater degree than did the low ability subjects. High ability subjects in the direct group also experienced a higher heart rate than the low ability subjects. However, there were no differences between high and low ability on any of the other dependent measures.
5. Self confidence in being able to tolerate the ice water without hypnosis and desire to cooperate in experiencing hypnosis were

correlated with decreased pain reports

6. Effortless experiencing was related to decreased pain report, decreased distress, and report of finding the hypnosis useful.
7. Expectations of finding the treatment useful were not correlated with pain measures.
8. After treatment, reports of finding the hypnosis useful was related with: statements that a trance was experienced, decreased pain ratings, and tolerance.
9. Reports of trance depth were correlated with tolerance. That is, those who kept their hand in the ice water for an extended period reported greater trance depth.
10. Reports of high ability to experience hypnosis were positively correlated with heart rate.
11. There was no relation between subjects' beliefs in terms of hypnotist's control verses self-control of the hypnotic experience, and the dependent measures. That is, scores on the dependent measures were not related to whether the individuals believed that they rather than the hypnotist was in control.
12. There was no relation between subjects' statements of resisting the suggestions and pain scores. That is, subjects scores on the dependent measures were not related to their level of resisting.

References

Alman, B. (1979). Consequences of direct and indirect suggestions on success of post-hypnotic behavior. (Doctoral Dissertation, California School of Professional Psychology, 1979). Dissertation Abstracts International, 40, 5369A

Anderson, J. A., Basker, M. A., & Dalton, R. (1975). Migraine and hypnotherapy. International Journal of Clinical and Experimental Hypnosis, 23, 48-58.

Angelos, J. (1978). Comparison of the effects of direct and indirect methods of hypnotic induction on the perception of pain. Doctoral dissertation, California School of Professional Psychology, 1978). Dissertation Abstracts. International, 39, 2972B

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review. 84, 191-215.

Barber, J. & Adrian, C. (Eds.) (1983). Psychological Approaches to the Management of Pain. New York: Brunner/Mazel.

Barber, J. (1977). Rapid induction analgesia: A clinical report. American Journal of Clinical Hypnosis, 19, 138-147.

Barber, J. (1980). Hypnosis and the unhypnotizable. The American Journal of Clinical Hypnosis, 23, 4-9.

Barber, J. (1982). Incorporating hypnosis in the management of pain. In J. Barber,and C. Adrian. (Eds.). Psychological Approaches to the Management of Pain. (pp. 40-69). New York: Brunner/Mazel.

Barber, J., & Mayer, D. (1977). Evaluation of the efficacy and neural mechanism of a hypnotic analgesia procedure in experimental and clinical dental pain. Pain. 4, 41-48.

Barber, T. X. & Hahn, K. W. (1964) Physiological and subjective responses to pain-producing stimulation under hypnotically suggested and waking-imagined analgesia. Journal of Abnormal and Social Psychology, 65, 411-415.

Barber, T. X. (1976). Hypnosis: A Scientific Approach. New York: Psychological Dimensions.

Barber, T. X. , Spanos, N. P. , & Chaves, J. F. (1974). Hypnosis, Imagination, and Human Potentialities. New York: Pergamon.

Barber, T. X., & Calverley, D. (1964). Comparative effects on Journal of Consulting Psychology, 28, 384.

Beach, J. (1981). Cognitive approaches to pain management. (Doctoral dissertation, University of Alberta, 1981).

Bean, B. W. , & Duff, J. L. (1975). The effects of video tape, and of situational and generalized locus of control, upon hypnotic susceptibility. American Journal of Clinical Hypnosis, 1, 28-33.

Beecher, H. K. (1968). Measurements of pain in man. In. A. Soulairac, J. Cahn, and J. Charpentier. (Eds.) Pain. London: Academic Press.

Bellisimo, A. & Tunks, E. (1984). Chronic Pain. New York: Prager.

Borkovec, T. D. & Nau, S. D. (1972). Credibility of analogue therapy rationales. Journal of Behavior Therapy and Experimental Psychiatry, 3, 257-260.

Bowers, K. S. (1971). Sex and susceptibility as moderator variables in the relationship of creativity and hypnotic susceptibility. Journal of Abnormal Psychology, 78, 93-100.

Bowers, K. S. (1971). The effects of UCS temporal uncertainty on heart rate and pain. Psychophysiology, 8, 382-389.

Bowers, K. S. (1976). Hypnosis For The Seriously Curious. Monterey: Brooks-Cole.

Bowers, K. S., & van der Meulen, S. A. (1972, Autumn). A comparison of psychological and chemical techniques in the control of dental pain. Paper delivered at the Society for Clinical and Experimental Hypnosis Convention, Boston.

Bowers, K. S., & Kelly, P. (1979). Stress, disease, psychotherapy and hypnosis. Journal of Abnormal Psychology, 88, 490-505.

Bowers, P. (1978) Hypnotizability, creativity and the role of effortless experiencing. International Journal of Clinical and Experimental Hypnosis, 26, 184-202.

Bowers, P. (1982). The classic suggestion effect: Relationships with scales of Hypnotizability, effortless experiencing, and imagery vividness. The International Journal of Clinical and Experiential Hypnosis, 30, 270-277.

Chaves, J. R. , & Barber, T. X. (1974). Cognitive strategies, experimenter modeling, and expectation in the attenuation of pain. Journal of Abnormal Psychology, 83, 356-363.

Coe, W. C. (1978). The credibility of posthypnotic amnesia: A contextualist's view. International Journal of Clinical and Experimental Hypnosis, 24, 281-286.

Council, J. R., Kirsch, I., Vickery, A. R., & Carlson, D. (1983). Trance versus skill hypnotic inductions: The effects of credibility, expectancy, and experimenter modeling. Journal of Consulting and clinical Psychology, 51, 432-440.

Diamond. M. J. (1977). Hypnotizability is modifiable: An alternative approach. International Journal of Clinical and Experimental Hypnosis, 25, 147-166.

Dworkin, S. F., & Chen, A. C. (1981). Cognitive modification of pain by varying context, expectation, information, and suggestion. Pain. (Suppl. 1).

Elton, D. , Stanley, G. , & Burrows, G. (1983). Psychological Control of Pain. Sydney: Grune & Stratton.

Erickson, M. (1966). Interspersal hypnotic techniques for symptom correction and pain control. American Journal of Clinical Hypnosis. 8. 198-209.

Erickson, M. H. , & Rossi, E. L. (1979). Hypnotherapy: An exploratory casebook. New York: Irvington.

Erickson, M. H. , Rossi, E. L., & Rossi, S. I. (1976). Hypnotic Realities. New York: Irvington.

Evans, M. B. , & Paul, G. L. (1970), Effects of hypnotically suggested analgesia on physiological and subjective responses to cold stress. Journal of Consulting and Clinical Psychology. 35, 362-371.

Feurstein, M. , & Skjei, E. (1979) Mastering Pain. New York: Bantam.

Filllenbaum, S. (1966). Prior deception and subsequent experimental performance: The faithful subject. Journal of Personality and Social Psychology, 4, 532-537.

Finer, B. & Terenius, L. (1981). Endorphin involvements during hypnotic analgesia in chronic pain patients. Paper presented at the Third World Congress on Pain of the International Association for the Study of Pain, Edinburgh, Scotland, September 4-11.

Finer, B. (1983). Treatment in an interdisciplinary pain clinic. In J. Barber,and C. Adrian. (Eds.). Psychological Approaches to the Management of Pain. (pp. 186-204). New York: Brunner/Mazel.

Folkard, S. ((1976). Diurnal variation and individual differences in the perception of intractable pain. Journal of Psychosomatic Research, 20, 289-301.

Fricton, J. R. , & Roth, P. (1985). The effects of direct and indirect hypnotic suggestion for analgesia in high and low susceptible subjects. American Journal of Clinical Hypnosis, 27, 226-231.

Friedman, H. , Thompson, R. B. , & Rosen, E.F. (1985). Perceived threat as a major factor in tolerance for experimentally induced cold-water pain. Journal of Abnormal Psychology, 34, 624-629.

Gill, K. M. (1984). Coping effectively with invasive medical procedures: A descriptive model.Clinical Psychology Review, 4, 339-362.

Girodo, M. , & Wood, D. (1979). Talking yourself out of pain: The importance of believing that you can. Cognitive Therapy and Research. 3, 23-33.

Goldstein, A. & Hilgard, E. (1975) Lack of influence of the morphine antagonist naloxone on hypnotic analgesia. Proceedings of the National Academy of Sciences, 72, 2041-2043.

Goolkasian, P. (1980). Cyclic changes in pain perception: An ROC analysis. Perception and Psychophysics. 6, 499-504.

Haley, J. (1973). Uncommon Therapy: The Psychiatric Techniques of Milton H. Erickson. New York: Norton.

Haley, J. (Ed.) (1967). Advanced Techniques of Hypnosis and Therapy. New York: Grune & Stratton.

Harris, G. , & Rollman, G. B. (1983). The validity of expérimental pain measures. Pain. 17, 369-376.

Hilgard, E. R. & Morgan, A. H. (1975). Heart rate and blood pressure in the study of laboratory pain in man under normal conditions and as influenced by hypnosis. Acta Neurologiae Experimentalis, 35, 741-759.

Hilgard, E. R. (1965). Hypnotic Susceptibility. New York: Harcourt, Brace & World.

Hilgard, E. R. (1975). Hypnosis. Annual Review of Psychology, 26, 19-44.

Hilgard, E. R. (1977). Divided Consciousness: Multiple Controls in Human Thought and Action. New York: Wiley.

Hilgard, E. R. , & Hilgard J. R. (1983). Hypnosis in the Relief of Pain. Los Altos, Kaufmann.

Hilgard, E. R. , Morgan, A. H. , & Macdonald, H. (1975). Pain and dissociation in the cold pressor test: A study of hypnotic analgesia with "hidden reports" through automatic key pressing and automatic talking. Journal of Abnormal Psychology, 84, 280-289.

Hilgard, E.R. (1971). Pain: Its reduction and production under hypnosis. Proceedings of the American Philosophical Society, 115, 470-476.

Holmes, J. D. , Hekmat, H. , & Mozingo, B. S. (1983). Cognitive and behavioral regulation of pain: The facilitative effects of analgesic suggestions. Psychological Record, 33, 151-159.

Holmes, K. M. , & Houston, B. K. (1974). Effectiveness of situation redefinition and affective isolation in coping with stress. Journal of Personality and Social Psychology, 29,212-218.

Hungerford, L. E. (1984). Direct and indirect hypnotic induction Texas A&M University, 1985). Dissertation Abstracts International, 45, 394.

Isaac, S., & Michael, W. B. (1981). Handbook in Research and Evaluation. San Diego: Edits.

Jaremko, M. E. , Silbert, L. ,& Mann, T. (1981). The differential ability of athletes and nonathletes to cope with two types of pain: A radical behavioral model. Psychological Record, 31, 265-275.

Kanfer, F. H., & Seidner, M. L. (1973). Self-control: Factors enhancing tolerance of noxious stimulation. Journal of Personality and social Psychology, 25, 381-389.

Kazdin, A. E. (1978). Evaluating the generality of findings in analogue therapy research. Journal of Consulting and Clinical Psychology, 46, 673-686.

Kelman, H. C. (1972) The rights of the subject in social research: An analysis in terms of relative power and legitimacy. American Psychologist, 27, 989-1016.

Kirsch, I. (1985) Response expectancy as a determinant of experience and behavior. American Psychologist, 40, 1189-1202.

Kroger, W., & Fezler, W. (1974). Hypnosis and Behavior Modification: Imagery Conditioning. Philadelphia: Lippincott.

Lacey, J. I. (1956). The evaluation of autonomic responses: Toward a general solution. Annals of the New York Academy of Sciences, 67, 123-164.

Lacey, J. I. , Bateman, D. E. , & Van Lehan, R. (1953). Autonomic response specificity and Rorschach color responses. Psychosomatic Medicine, 14, 256-260.

Langer, E. J. , Janis, I. L. , & Lolfer, J. (1975). Reduction of stress in surgical patients. Journal of Experimental Social Psychology, 11, 155-165.

Lankton, S. R. , & Lankton, C. H. (1983). The Answer Within: A Clinical Framework of Ericksonian Hypnotherapy. New York: Brunner/Maze.

Laurence, J., & Nadon, R. (1986) Reports of hypnotic depth: Are they more than mere words? International Journal of Clinical and Experimental Hypnosis, 34, 215-233

Lenox, J. R. (1970). Effect of hypnotic analgesia on verbal report and cardiovascular responses to ischemic pain. Journal of Abnormal Psychology, 75, 199-206

Leventhal, H., Brown, D.; Shacham, S. & Engquist, G. (1979). Effects of preparatory information about sensations, threat of pain, and attention on cold pressor distress. Journal of Personality and Social Psychology, 37, 688-714.

Mathews, B. , & Searle, B. (1976). Electrical stimulation of teeth. Pain, 2, 245-251.

Mathews, W. J., Bennett, H., Bean, W., & Gallagher, M. (1985). Indirect versus direct hypnotic suggestions. An Initial investigation. International Journal of Clinical and Experimental Hypnosis, 33, 219-223.

McGlashan, T. H. , Evans, F. J. , & Orne, M. T. (1969). The nature of hypnotic analgesia and placebo response to experimental pain. Psychosomatic Medicine, 31, 227-246.

Meichenbaum, D.H. (1977). Cognitive Behavior Modification. New York: Plenum Press.

Melzack, R. (1973). The Puzzle of Pain. New York: Basic Books.

Melzack, R. , & Wall, P. D. (1968). Gate control theory of pain. In A. Soulairac, J. Cahn , & J. Charpentier (Eds.) , Pain. London: Academic Press.

Miller, L. J. (1976). A comparison of hypnotic susceptibility for internal and external locus of control subjects in hetero- and self-hypnotic treatments (Doctoral dissertation, Brigham Young University, 1976). Dissertation Abstracts International, 37, 978.

Minuchin, S., Rosman, B. L., & Baker, L. (1978). Psychosomatic Families. Cambridge: Harvard University Press.

Morgan, A. H., Johnson, D. L., & Hilgard, E. R. (1974). The stability of hypnotic susceptibility: A longitudinal study. International Journal of Clinical and Experimental Hypnosis, 22, 249-257.

Negley-Parker, E. (1986). Physiological correlates and effects of hypnosis. In B. Zilbergeld, M. G. Edelstien, & D. L. Araoz (Eds.), Hypnosis questions and answers. (pp. 9-15). New York: Norton.

Nogrady, H. , McConkey, K. V. , Laurence, J. R. & Perry, C. (1983) Dissociation, duality, and demand characteristics in hypnosis. Journal of Abnormal Psychology, 2, 223-235.

Notermans, S. , & Tophoff, M. (1967). Sex difference in pain tolerance and pain apperception. Psychiatria, Neurologia, Neurochirurgia, Journal of the Netherlands Society of Psychiatry and Neurology, 70, 23-29.

Nottermans, S. , & Tophoff, M. (1975). Sex differences in tolerance and pain apperception. In M. Weisenberg (Ed.), Pain: clinical and experimental perspectives. St. Louis: Mosey.

Orne, M. T. (1959). The nature of hypnosis: Artifact and essence. Journal of Abnormal Social Psychology, 58, 277-299.

Orne, M. T. (1971). Hypnosis, motivation, and the ecological validity of the psychological experiment. Nebraska Symposium on Motivation, 18, 187-265.

Orne, M. T. On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications. American Psychologist, 17, 116-783.

Orne, M. T.(1969). Demand characteristics and the concept of quasi-controls. In R. Rosenthal and R. Rosnow (Eds.). Artifact in Behavioral Research. New York: Academic Press.

Osberg, T. & Shrauger, J. (1986). Self-prediction: Exploring the parameters of accuracy. Journal of Personality and Social Psychology, 51, 1044-1057

Otto, M. W. , & Dougher, M. J. (1985). Sex differences and personality factors in responsivity to pain. Perceptual and Motor Skills, 61, 383-390.

Pereira, M. J. (1978). Locus of control, interpersonal trust and status of the hypnotist as predictors of hypnotic susceptibility (Doctoral dissertation, Saint Louis University, 1978). Dissertation Abstracts International, 39, 1494B.

Perry, C. , Gelfand, R. , & Marcovitch, R. (1979). The relevance of hypnotic susceptibility in the clinical context. Journal of Abnormal Psychology, 88, 592-603.

Pistole, D. D. (1978). A multivariate assessment of hypnotic susceptibility as a function of locus of control, method of induction, and sex of subject (Doctoral dissertation, University of New Hampshire, 1979). Dissertation Abstracts International, 40, 1403A.

Raphael, I. A. (1981) The effects of imagery, cognitive modification, and cognitive style, in dealing with pain (Doctoral dissertation, University of Alberta, 1981).

Rollman, G. B. (1983) Measurement of experimental pain in chronic pain patients: Methodological and individual factors. In R. Melzack (Ed.) Pain Measurement and Assessment. New York: Raven Press.

Rosenberg, M. J. (1965) When dissonance fails: On eliminating evaluation apprehension from attitude measurement. Journal of Personality and Social Psychology, 1, pp. 28-42.

Rosenthal, R. & Rosnow, R. (1975). The Volunteer Subject. New York:Wiley & Sons

Sacerdote, P. (1970) Theory and practice of pain control in malignancy and other protracted or recurring painful illness. International Journal of Clinical and Experimental Hypnosis, 18, 160-180.

Sacerdote, P. (1982). Techniques of hypnotic intervention with pain patients. In.J. Barber,& C. Adrian. (Eds.). Psychological Approaches to the Management of Pain. (pp. 60-79). New York: Brunner/Mazel.

Sarbin, T. R. & Coe, W. C. (1972) Hypnosis: A Social Psychological Analysis of Influence Communication. New York: Holt, Rinehart & Winston.

Sarbin, T. R. , & Slagle, R. W. (1979). Hypnosis and psychophysiological outcomes. In Fromm, E. & Shor, R. E. (Eds.) , Hypnosis: Developments in Research and New Perspectives. (pp. 273-303). New York: Aldine.

Schafer, D. , & Hernandez, A. (1978). Hypnosis, pain and the context of therapy. International Journal of Clinical and Experimental Hypnosis, 26, 143-153.

Sheehan, P. W. (1979). Hypnosis and the processes of imagination. In E. Fromm, & R. E. Shor (Eds.), Hypnosis: Developments in research and new perspectives. New York: Aldine.

Shor, R. E. , & Orne, E. C. (1962). Harvard Group Scale of Hypnotic Susceptibility. Palo Alto, Consulting Psychologists Press.

Silverman, I. (1968) Role-related behavior of subjects in laboratory studies of attitude change. Journal of Personality and Social Psychology, 8, 343-348.

Singer, J. L. , & Pope, K. (1981). Daydreaming and imagery skills as predisposing capacities for self-hypnosis. International Journal of Clinical and Experimental Hypnosis, 24, 271-281.

Spanos, N. P. (1982). A social psychological approach to hypnotic behavior. In G. Weary & H. L. Mirels (Eds.), Integrations of clinical and social psychology (pp. 231-271). New York: Oxford.

Spanos, N. P. , & Gorassini, D. R. (1984). Structure of hypnotic test suggestion and attributions of responding involuntarily. Journal of Personality and Social Psychology, 46, 688-696.

Spanos, N. P. , Brown, J. M. , Jones, B. , & Horner, D. (1981). Cognitive activity and suggestions for analgesia in the reduction of reported pain. Journal of Abnormal Psychology, 90, 554-561.

Spanos, N. P. , Gwynn, M. I. , & Stam, H. J. (1983). Instructional demands and ratings of overt and hidden pain during hypnotic analgesia. Journal of Abnormal Psychology, 92, 479-488.

Spanos, N. P. , Hodgins, D. C. , Stam, H. J. , & Gwynn, M. (1984). Suffering for science: The effects of implicit social demands on response to experimentally induced pain. Journal of Personality and Social Psychology, 46, 1162-1172.

Spanos, N. P. , Kennedy, S. K. , & Gwynn, M. I. (1984). Moderating effects of contextual variables on the relationship between hypnotic susceptibility and suggested analgesia. Journal of Abnormal Psychology, 93, 285-294.

Spanos, N. P. , Ollerhead, V. G. , & Gwynn, M. I. (1983). A comparison of three cognitive treatments for the control of pain magnitude and pain tolerance in experimental subjects. Unpublished manuscript. Carleton University, Ottawa, Ontario, Canada.

Spanos, N. P. , Radtke-Bodorik, L. , Ferguson, J. D. , & Jones, B. (1979). The effects of hypnotic susceptibility , suggestions for analgesia, and the utilization of cognitive strategies on the reduction of pain. Journal of Abnormal Psychology, 88, 282-292.

Spanos, N. P. , Rivers, S. M. & Ross, S. (1977). Experienced involuntariness and response to hypnotic suggestion. Annals of the New York Academy of sciences, 296, 280-221.

Spanos, N. P., & Barber, T. (1974) Toward a convergence in hypnosis research. American Psychologist, 29, 500-511.

Stam, H. J., & Spanos, N. P. (1980). Experimental Designs, Expectancy Effects, and Hypnotic Analgesia. Journal of Abnormal Psychology, 89, 751-762.

Stam, H., Petrusic, W., & Spanos, N. P. (1981) Magnitude scales for cold pressor pain. Perception and Psychophysics, 29, 612-617.

Staub, E. , Tursky, B. , & Schwartz, G. E. (1971). Self-control and :Their effects on reactions to aversive stimulation. Journal of Personality and Social Psychology, 18, 157-162.

Sternbach, R. A. (1968). Pain: A Psychological Analysis. New York: Academic Press.

Strassberg, D. S. , & Klinger, B. I. (1972). The effect on pain tolerance of social pressure within the laboratory setting. Journal of Social Psychology, 88, 123-130.

Sutcliffe, J. P. (1961). "Credulous" and "skeptical" views of hypnotic phenomena: Experiments in esthesia, hallucination, and delusion. Journal of Abnormal and Social Psychology, 62, 189-200.

Tellegen, A , & Atkinson, G. (1974) Openess to absorbing and self-altering experiences ("Absorption"), a trait related to hypnotic susceptibility. Journal of Abnormal Psychology, 83, 268-277.

Trope, Y. (1983). Self-assessment in achievement behavior. In J. Suls & A. Greenwald (Eds.), Psychological Perspectives On the Self Vol. 2. (pp. 93-121). Hillsdale: Erlbaum.

Turk, D. C. (1978). Cognitive behavioral techniques in the management of pain. In J. P. Foreyt, and D. P. Rathjen (Eds.). Cognitive Behavior Therapy. New York: Plenum Press.

Van Gorp. W. G. , Meyer, R. G. , & Dunbar, K. D. (1985). The efficacy of direct versus indirect hypnotic induction techniques on reduction of experimental pain. The International Journal of Clinical and Experimental Hypnosis. 33. 19-328.

Wadden, T. A. , & Anderson, C. H. (1982). The clinical use of hypnosis. Psychological Bulletin. 2. 215-243.

Wagstaff, G. F. (1981). Hypnosis, compliance and belief. New York: St. Martins.

Weitzenhoffer, A. M. (1980). Hypnotic Susceptibility Revisited. American Journal of Clinical Hypnosis, 22. 130-146.

Weitzenhoffer, A. M. , & Hilgard, E. R. (1962). Stanford Hypnotic Susceptibility Scale, Form C. Palo Alto: Consulting Psychologists Press.

Wicklund, R. A., & Gollwitzer, P. M. (1983) Amotivational factor in self-report validity, In J. Suls & A Greenwald (Eds.). Psychological Perspectives On the Self Vol. 2. (pp. 67-92). Hillsdale: Erlbaum.

Wickramasekera, I. (1976) Biofeedback, Behavior Therapy and Hypnosis: Potentiating the Verbal Control of Behavior for Clinicians. Chicago: Nelson-Hall.

Wolff, B B. (1964). The relationship of experimental pain tolerance of pain thresholds: a critique of Gelfand's paper. Canadian Journal of Psychology, 18, 249-253.

Wolff, B. B. (1980). Measurement of human pain. In J. J. Bonica (Ed.), Pain. (pp. 173-184). New York: Raven Press.

Woodrow, K. M. , Friedman, G. D. , Siegelaub, A B. , & Collen, M. F. (1972). Pain tolerance: Differences according to age, sex and race. Psychosomatic Medicine, 6, 548-556.

Yanchar. R. J. , & Johnson, H. J. (1981). Absorption and attitude towards hypnosis: A moderator analysis. International Journal of Clinical and Experimental Hypnosis, 29, 375-382.

Yeargan, L. D. (1986). Emotive imagery and pain tolerance (Doctoral dissertation, University of southern California, 1985). Dissertation Abstracts International, 46, 3234B.

Appendix A Introduction

Name:_____ Age:_____ Male: ___ Female: ___
Hypnotized before? Yes_____ No_____

This study is about the effects of hypnosis or suggestibility in helping individuals cope with psychological responses to uncomfortable physical sensations. The procedures used in the study are safe and will not harm you in any way.

To test for the effects of hypnosis this experiment involves subjects putting their hands in ice water. Your hand will be placed in a container of ice water and you will be asked to touch the bottom of the pail with your middle finger and relax you hand. While your hand is in the ice water you will be asked report your degree of comfort. Every time you hear the experimenter say "report" answer on a scale of one to seven your level of comfort. "One" represents "very comfortable" and "seven" represents "intolerable pain." Of course you may choose any number between one and seven as well. For example, if the ice water is very uncomfortable but not intolerable than you may pick the number five or six.

First however, it is necessary to collect your beliefs and expectations about hypnosis or suggestibility and your reactions to cold water.

The following questions are designed to gather some of the relevant information. Please answer them as honestly as you can, and remember that there are no wrong or right answers. What is most important are the responses that you have to these questions.

The information you provide is kept confidential and will be used only for purposes of research in hypnosis. Please enter your name, age, sex and whether or not you've been hypnotized before at the top of this page.

Appendix B Pre Questions

On the following questions circle a number from one to seven that best represents your answer.

1. "I would consider myself to be suggestible."

1 2 3 4 5 6 7
strongly disagree strongly agree

2. "I believe that I would be able to experience hypnosis."

1 2 3 4 5 6 7
strongly disagree strongly agree

3. "Going into hypnosis depends primarily on the ability of the hypnotist, as opposed to the ability of the client.

1 2 3 4 5 6 7
strongly disagree strongly agree

4. "Hypnosis is an altered state of consciousness quite different from normal waking consciousness."

1 2 3 4 5 6 7
strongly disagree strongly agree

5. "Hypnosis is a normal state of consciousness that simply involves the focusing of attention."

1 2 3 4 5 6 7
strongly disagree strongly agree

6. "People who go into hypnosis easily, experience what the hypnotist is suggesting to them without consciously trying to make it happen."

1 2 3 4 5 6 7
strongly disagree strongly agree

7. "I am confident of my ability to keep my hand in ice water without hypnosis."

1 2 3 4 5 6 7
strongly disagree strongly agree

8. "I am confident that hypnosis would be helpful to me in keeping my hand in ice water without much discomfort."

1 2 3 4 5 6 7
strongly disagree strongly agree

9. "Suggestions given during hypnosis can significantly reduce or eliminate the experience of discomfort."

1 2 3 4 5 6 7
strongly disagree strongly agree

10. "I would want to cooperate in experiencing hypnosis?"

1 2 3 4 5 6 7
strongly disagree strongly agree

11. "If I were in an experiment that involved measuring the length of time I was able to keep my hand in ice water, I would want to keep my hand in the water for as long as possible."

1 2 3 4 5 6 7
strongly disagree strongly agree;osaa

Appendix C Post Questions

On the following questions circle a number from one to seven that best represents your answer.

1. "I spent little effort in keeping my hand in the water."

1 2 3 4 5 6 7
strongly disagree strongly agree

2. "I was able to experience the suggestions made by the hypnotist."

1 2 3 4 5 6 7
strongly disagree strongly agree

3. "I resisted the suggestions made by the hypnotist."

1 2 3 4 5 6 7
strongly disagree strongly agree

4. "The hypnosis was useful in helping me keep my hand in the water."

1 2 3 4 5 6 7
strongly disagree strongly agree

5. "I experienced a hypnotic trance."

1 2 3 4 5 6 7
strongly disagree strongly agree

6. "My experience of the hypnosis was what I thought it would be."

1 2 3 4 5 6 7
strongly disagree strongly agree

7. "My experience of hypnosis was determined by the hypnotist, and not determined by what I wanted."

1 2 3 4 5 6 7
strongly disagree strongly agree

8. "The hypnotist was trying to convince me that I was having certain experiences."

1 2 3 4 5 6 7
strongly disagree strongly agree

Appendix D Direct Induction - Description

I am going to give you a hypnotic induction that is designed to assist you in keeping your hand in ice water with as little discomfort as possible.

I will describe what I will be saying in the hypnotic induction and then I will ask you some questions about how useful you think this induction will be in helping you keep your hand in the ice water.

I will tell you to close your eyes and concentrate on relaxing your body.
I will tell you to let to concentrate on parts of your body such as your shoulders and legs and let those parts relax. I will tell you that your feet, arms, and legs will feel like lead and that you will feel very heavy. You will be told that your whole body will become heavy and wooden like. You will be directed to picture in your mind seeing yourself standing at the top of some stairs with 20 steps. As I count from one to twenty, you will begin to move down the stairs and you will go deeper and feel heavier with each step. When you have reached the bottom of the stairs, I will tell you what you will experience and that you will experience it exactly the way I tell you. I will tell you that you will carry out every instruction faithfully. As I count to five your right hand will become increasingly numb and dull and that it will feel no sensations at all. I will tell you that I will put your hand in the ice water and that you will feel nothing at all.

Appendix E Indirect Induction - Description

I will describe what I will be saying in the hypnotic induction and then I will ask you some questions about how useful you think this induction will be in helping you keep your hand in the ice water with as little discomfort as possible.

I will ask you to notice if you feel more comfortable when you take a deep breath and close your eyes. I will ask you to be aware if your neck and shoulders begin to feel more comfortable. I will tell you that whatever you notice is just fine that there is nothing you really have to do nor is there anyone you have to please. I will ask you to see a staircase any way that you want to. As you begin to go down the stairs I will ask you to notice how much more comfortable and relaxed you may feel. I will ask you to notice if there are parts of your body that feel more relaxed than others. I will suggest to you that at the bottom of the stairs that you will feel very relaxed and comfortable. I will tell you that it is not necessary to remember everything that I talk about all at once but you may feel surprised that your visit here today is more comfortable that you might expect. I will suggest to you that when I touch your wrist that this will be a signal to you to remain absolutely comfortable and relaxed and that you will experience only mild surprise about how comfortable you feel and will continue to feel as I place your hand in the ice water. I will tell you that you will probably be aware of how comfortably the chair is supporting you and that there are no other feelings.

Appendix F Credibility

1. How logical does this procedure seem to you?

1 2 3 4 5 6 7
not at all logical very logical

2. How confident are you that you can become hypnotized by this method?

1 2 3 4 5 6 7
not at all confident very confident

3. How confident would you be in recommending this procedure to a friend who wanted to experience hypnosis?

1 2 3 4 5 6 7
not at all confident very confident

4. How willing are you to experience this type of hypnotic induction?

1 2 3 4 5 6 7
not at all willing very willing

5. How effective do you think this hypnotic procedure will be in helping you cope with immersing your hand in ice water?

1 2 3 4 5 6 7
not at all effective very effective

Appendix G Indirect Induction

I'd like to talk with you for a moment to see if you'd like to feel more comfortable and relaxed than you might expect. Would you like to feel more comfortable than you do right now?

I'm quite sure that it will seem to you that I have really done nothing, that nothing has happened at all. You may feel a bit more relaxed, in a moment, but I doubt that you'll notice any other changes. I'd like you to notice though, if you're surprised by anything else you might notice. OK, then the really best way to *begin feeling more comfortable* is to just begin by sitting as comfortably as you can right now. . . go ahead and adjust yourself to the most comfortable position you like. . . that's fine. Now, I'd like you to notice how much more comfortable you can feel by just taking one very big, satisfying deep breath. Go ahead. . . big, deep, satisfying breath. . . That's fine. You may already notice *how good that feels*. . . how warm your neck and shoulders can feel . . . Now, then . . . I'd like you to take four more very deep, *very comfortable* breaths . . . and, as you exhale, notice . . . just notice how comfortable your eyes can feel when they close . . . and when they close, just let them stay closed . . . that's right, just notice that . . . and notice, too, how, when you exhale, you can just *feel that relaxation beginning to sink in* . . . Good, that's fine . . . now, as you continue breathing, comfortably and deeply and rhythmically, all I'd like you to do is to picture in your mind . . . just imagine a staircase, any kind you like . . . with 20 steps, and you at the top . . . Now, you don't need to see all 20 steps at once, you can see any or all of the staircase, any way you like . . . that's fine . . . Just notice yourself, at the top of the staircase, and the step you're on, and any others you like . . . However you see it is fine . . . Now, in a moment, but not yet, I'm going to begin to count, out loud, from one to 20, and . . . as you may already have guessed . . . as I count each number I'd like you to take a step down that staircase . . . see yourself stepping down, feel yourself stepping down, one step for each number I count . . . and all you need to do is notice, just notice, how much more comfortable and relaxed

you can feel at each step, as you go down the staircase . . . one step for each number that I count . . . the larger the number, the farther down the staircase . . . the farther down the staircase, the more comfortable you can feel . . . one step for each number . . . all right, you can begin to get ready . . . now, I'm going to begin . . . . ONE. . . one step down the staircase. . . TWO. . . two steps down the staircase. . . that's fine. . . THREE . . . three steps down the staircase . . . and maybe you already notice how much more relaxed you can feel . . . I wonder if there are places in your body that *feel more relaxed* than others. . . . perhaps your shoulders feel more relaxed than your neck . . . perhaps your legs feel more relaxed than your arms . . . I don't know, and it really doesn't matter . . . all that matters is that you feel comfortable . . . that's all . . . . FOUR . . . four steps down the staircase, perhaps feeling already places in your body beginning to relax . . . I wonder if the deep relaxing, restful heaviness in your forehead is already beginning to spread and flow . . . down, across your eyes, down across your face, into your mouth and jaw . . . FIVE. . . five steps down the staircase . . . a quarter of the way down, and already beginning, perhaps, to really , really enjoy your relaxation and comfort . . . SIX . . . six steps down the staircase . . . perhaps beginning to notice that the sounds which were distracting become less so . . . that all the sounds you can hear become a part of your experience of comfort and relaxation . . . anything you can notice becomes a part of your experience of comfort and relaxation . . . SEVEN. . . seven steps down the staircase . . . that's fine . . . perhaps noticing the heavy, restful, comfortably relaxing feeling spreading down into your shoulders, into your arms . . . I wonder if you notice one arm feeling heavier than the other . . . perhaps your left arm feels a bit heavier than your right . . . or does your right arm feel a bit warmer than your left . . . I don't know, perhaps they both feel equally, comfortably heavy . . . It really doesn't matter . . . just letting yourself become more and more aware of that comfortable heaviness . . . or is it a feeling of lightness? . . . I really don't know, and it really doesn't matter . . . EIGHT . . . eight steps down the staircase . . . perhaps noticing that, even as you relax, your heart seems to beat much faster and harder than you might expect, perhaps

noticing the tingling in your fingers . . . NINE . . . nine steps down the staircase, breathing comfortably, slowly, and deeply . . . restful, noticing that heaviness really beginning to sink in, as you continue to notice the pleasant, restful, comfortable relaxation just spread through your body . . : TEN . . . ten steps down the staircase . . . halfway to the bottom of the staircase, wondering perhaps what might be happening, perhaps wondering if anything at all is happening . . . and yet knowing that it really doesn't matter, feeling so pleasantly restful, just continuing to notice the growing, spreading, comfortable relaxation. . . ELEVEN . . . eleven steps down the staircase . .. . noticing maybe that as you feel increasingly heavy, more and more comfortable, there's nothing to bother you, nothing to disturb you, as you become deeper and deeper relaxed . . . TWELVE . . . twelve steps down the staircase . . .I wonder if you notice how easily you can hear the sound of my voice . . . how easily you can understand the words I say . . . with nothing to bother, nothing to disturb . . . THIRTEEN . . . thirteen steps down the staircase, feeling more and more the real enjoyment of this relaxation and comfort . . . FOURTEEN . . . fourteen steps down the staircase . . . noticing perhaps the sinking, restful pleasantness as your body seems to just sink down, deeper and deeper into the chair, with nothing to bother, nothing to disturb . . . as though the chair holds you, comfortably and warmly . . . FIFTEEN. . . fifteen steps down the staircase . . . three-quarters of the way down the staircase . . . deeper and deeper relaxed, absolutely nothing at all to do . . . but just enjoy yourself . . .SIXTEEN . . . sixteen steps down the staircase . . . wondering perhaps what to experience at the bottom of the staircase . . . and yet knowing how much more ready you already feel to become deeper and deeper relaxed . . . more and more comfortable, with nothing to bother, nothing to disturb . . . SEVENTEEN . . . seventeen steps down the staircase . . . closer and closer to the bottom, perhaps feeling your heart beating harder and harder, perhaps feeling the heaviness in your arms and legs become even more clearly comfortable . . . knowing that nothing really matters except your enjoyment of your experience of comfortable relaxation, with nothing to bother, nothing to disturb . . . EIGHTEEN . . . eighteen steps down the

staircase . . . almost to the bottom, with nothing to bother, nothing to disturb, as you continue to go deeper and deeper relaxed . . . heavy. . . comfortable . . . restful . .. . relaxed . .. . nothing really to do, no one to please, no one to satisfy . . . just to notice how *very comfortable* and heavy *you can feel*, and continue to feel as you continue to breathe, slowly and comfortably . . . restfully . . . NINETEEN . . . nineteen steps down the staircase . . . almost to the bottom of the staircase . . . nothing to bother, nothing to disturb you as you *continue to feel more and more comfortable*, more and more relaxed, more and more rested . . . more and more comfortable . . . just noticing . . . and now . . . TWENTY . . . bottom of the staircase . . . *deeply, deeply relaxed* . . . deeper with every breath you take . . . as I talk to you for a moment about something you already know a lot about . . . remembering and forgetting . . . you know a lot about it, because we all do a lot of it . . . every moment, of every day you remember . . . and then you forget, so you can remember something else . . . you can't remember everything, all at once, so you let some memories move quietly back in your mind . . . I wonder, for instance, if you remember what you had for lunch yesterday . . . I would guess that, with not too much effort, you can remember what you had for lunch yesterday . . . . and yet . . . I wonder if you remember what you had for lunch a month ago today . . .I would guess the *effort is really too great* to dig up that memory, though of course it is there . . . somewhere, deep in the back of your mind . . . no need to remember, so *you don't* . . . and I wonder if *you'll be pleased* to notice that the things we talk about today, with your eyes closed, are things which you'll remember minutes from now, tomorrow, or the next day . . . I wonder if you'll decide to let the memory of these things rest quietly in the back of your mind . . . or if you'll remember gradually, a bit at a time . . . or perhaps all at once, to be again resting in the back of your mind . . . perhaps you'll be surprised to notice that sitting here in this chair is the place for memory to surface . . . perhaps not . . . perhaps you'll notice that it is more comfortable to remember on another day altogether . . . it really doesn't matter . . .. . doesn't matter at all . . . . whatever you do, however you choose to remember . . . is just fine . . . absolutely natural . . . doesn't matter at

all . . . whether you remember tomorrow or the next day, whether you remember all at once, or gradually . . . completely or only partially . . . whether you let the memory rest quietly and comfortably in the back of your mind . . . really doesn't matter at all . . . and, too, I wonder if you'll notice that you'll *feel surprised* that your visit here today is so much *more pleasant* and comfortable than you might have expected . . . I wonder if you'll *notice that surprise* . . . that there are *no other feelings* . . . perhaps you'll *feel curious* about that surprise . . . surprise, curiosity . . . I wonder if you'll *be pleased* to notice that during the experiment you may become aware of certain sensations . .... . you'll probably be aware of the pleasing touch of the chair supporting your back, the comfortable feeling of the chair supporting your legs, your feet resting comfortably on the floor . . and you may be pleasantly surprised that when your hand sinks easily into the water, you'll probably be able to feel the wetness of the water . . . you may become curious about this, and feel surprised that there are no other feelings to notice . . . that the pleasing touch of the chair on your back and legs, the comfort of your feet on the floor, the wetness of the water all help you to realize that there are no other feelings to notice . . . nothing to bother you . . . nothing to disturb you . . . when you again feel your back resting against the chair . . . you'll feel reminded of how very comfortable you are feeling right now . . . even more comfortable than you feel even now . . . comfortable, relaxed . . . nothing to bother, nothing to disturb . . . I wonder if you'll be reminded of this comfort by just noticing your feet resting on the floor, your legs supported by the chair . . .. perhaps this comfort and relaxation will come flooding back, quickly and automatically, when you find your hand sinking into the water . . . I don't know exactly how it will seem . . . I only know, as perhaps you also know . . . that your experience will seem surprisingly more pleasant, surprisingly more comfortable, surprisingly more restful that you might expect . . . with nothing to bother, nothing to disturb . . . whatever you are able to notice . . . everything can be a part of your experience of comfortableness, restfulness and relaxation . . . everything you notice can be a part of feeling absolutely comfortable . . . and I want to remind you that whenever I touch you on the wrist .

. . you'll experience a feeling . . . a feeling of being ready to do something . . . whenever I touch your wrist . . . you'll experience a feeling . . . . . a feeling of being ready to do something . . . perhaps a feeling of being ready to be even more comfortable . . . perhaps ready to know even more clearly that there's nothing to bother, nothing to disturb you . . . perhaps ready to become heavy and tired . . . I don't know . . . but whenever I touch your wrist, . . . you'll experience a feeling . . . feeling of being ready to do something . . . it really doesn't matter . . . perhaps just a feeling of being ready to be even more surprised . . . it really doesn't matter . . . nothing really matters but your experience of comfort and relaxation . . . absolutely deep comfort and relaxation . . . with nothing to bother and nothing to disturb you.

Appendix H Direct Induction

Get Ready to begin . . . to relax and feel comfortable . . . Sit back comfortably in the chair . . . begin to relax . . .. comfortably . . . Look upwards and fix your eyes upon a spot on the ceiling . . . Stare at it continuously . . . Keep you eyes fixed on that spot on the ceiling . . . Let yourself go . . . comfortable and relaxed . . . Let all the muscles of your entire body relax completely . . . breathe quietly . . . in . . . and out . . . And now I want you to concentrate on your feet and your ankles . . . let them relax . . . let them feel totally comfortable . . . and limp . . . You will feel just as heavy as lead . . . Your feet feel as though they are sinking into the floor . . . Keep you eyes on the spot on the ceiling . . . And as you stare at it . . . you will find your eyelids are becoming heavier and heavier . . . and they will begin to close . . . as they get tired . . . Your eyes will want to close . . . As soon as they feel closed just let them close . . . Let yourself go completely . . . The muscles of your calves and thighs will go quite limp and comfortable . . . Let them go . . . let them relax . . . you will feel even more comfortable . . . Your eyes will begin to feel even more tired and become watery . . . They will feel so heavy that they will want to stay closed . . . Let yourself go completely . . . Give yourself up completely to this pleasant, drowsy, comfortable, relaxed feeling . . . You will let your whole body become heavy and wooden-like . . . Now picture in your mind . . . a staircase, with twenty steps . . . You are at the top . . . you will begin to get ready to go down the stairs . . . You will go deeper and feel heavier with each step . . . Shortly, I will count out loud from one to twenty . . . You will see yourself stepping down one step for each number that I count . . . You will notice how much more relaxed and comfortable you will feel at each step . . . The farther down the stairs, the more comfortable you will feel . . . All right, begin to get ready . . . Now, I'm going to begin . . . ONE . . . one step down the stairs . . . TWO . . . two steps down the stairs. . . You are beginning to feel more deeply relaxed, as you will feel yourself being more and more comfortable. . . THREE three steps down the stairs. . . noticing how much more relaxed you feel. . . noticing places in your body that are more

relaxed than others. . . Deeper and deeper. . . FIVE. . . five steps down the stairs. . . you will continue to go deeper and feel more comfortable the farther down you go. . . SIX. . . you will feel different parts of your body sinking and feeling heavier and heavier. . . SEVEN. . . seven steps down the stairs. . . enjoying how much more relaxed and deeper you feel. . . you will allow everything to become part of your experience. . . and noticing a deeper state. . . EIGHT. . . eight steps down the stairs. . . you will notice the heavy, restful, comfortable feeling spreading down into your shoulders, into your arms. . . NINE. . . your arms and legs will feel very heavy as you go deeper and deeper. . . TEN. . . ten steps down the stairs. . . you will breathe more comfortably, slowly, and deeply. . . noticing a pleasant, relaxed feeling spreading more and more. . . ELEVEN. . . eleven steps down the stairs. . . feeling increasingly heavy, more and more comfortable, as you become deeper and deeper relaxed. . . TWELVE. . . you will continue to breathe slowly and comfortably. . . THIRTEEN. . . thirteen steps down the stairs. . . you are continuing to feel more and more comfortable. . . more and more relaxed. . . more and more comfortable heavier and heavier. . . FOURTEEN. . . you will go deeper and deeper with every breath you take. . . sinking further and further down. . . FIFTEEN. . . you are now so deeply relaxed and deeply asleep. . . you will enjoy the comfort you are feeling. . . deeper and deeper. . . heavier and heavier. . . SIXTEEN. . . you will continue to relax very, very deeply. . . every feeling that you are experiencing will make you more and more comfortable. . . SEVENTEEN. . . all the muscles in you body are heavier and heavier. . . breathing deeply, comfortably, slowly, deeper and deeper relaxed. . . the sound of my voice will be easy to understand. . . the words will be clear. . . EIGHTEEN. . . you will feel more and more relaxed with each moment. . . Notice the comfort and heaviness you feel. . . continuing to breathe slowly and comfortably restfully. . . NINETEEN. . . deeper with every breath you take. . . You will notice that you will not remember everything. . . you only need to concentrate on total relaxation. . . remembering or forgetting each moment. . . just continuing to go deeper and feeling more relaxed. . . TWENTY. . . as you continue to enjoy your comfortable relaxation. . . notice your

arms and legs and the heaviness. . . your whole body's deeper and deeper sensations. . . The deeper and deeper feeling is a signal to follow all instructions. . . exactly as I tell you. . . you are now so deeply asleep that everything that I tell you that is going to happen. . . will happen exactly as I tell you. . . this will be easy for you. . . comfortable and relaxing. . . instructions will be followed just as I tell you. . . continuing to feel deeply relaxed and comfortable. . . every feeling that I tell you that you will experience. . . you will experience exactly as I tell you. . . and every instruction that I give you. . . you will carry out faithfully. . . Each moment passing. . . as you go deeper and feel more comfortable. . . easy, comfortable and relaxing. . . I am going to count to five and as I count, your right hand and arm will gradually lose their ability to feel, especially to feel pain. One, your hand and arm are becoming numb and dull. . . They are becoming anesthetic. . . Two, your hand and arm are becoming less and less capable of feeling pain, pressure, temperature, and other sensations. . . Three, your hand and arm are becoming numb, more and more numb. . . Soon they will feel nothing. . . Four, your hand and arm are losing their ability to feel any sensations. . . more and more. . . They are becoming more and more anesthetic. . . Soon they will be unable to feel anything at all. . . Five! , your hand and arm are now totally insensitive. They will be submerged into water, but you will feel nothing. This submersion will take place during the experiment a little later. Just before you submerge your hand and arm, I will touch you on the wrist. At that time you will feel just as you do right now, your hand and arm will be totally insensitive. . . it will feel nothing just as it does now. Totally anesthetic and insensitive. . .